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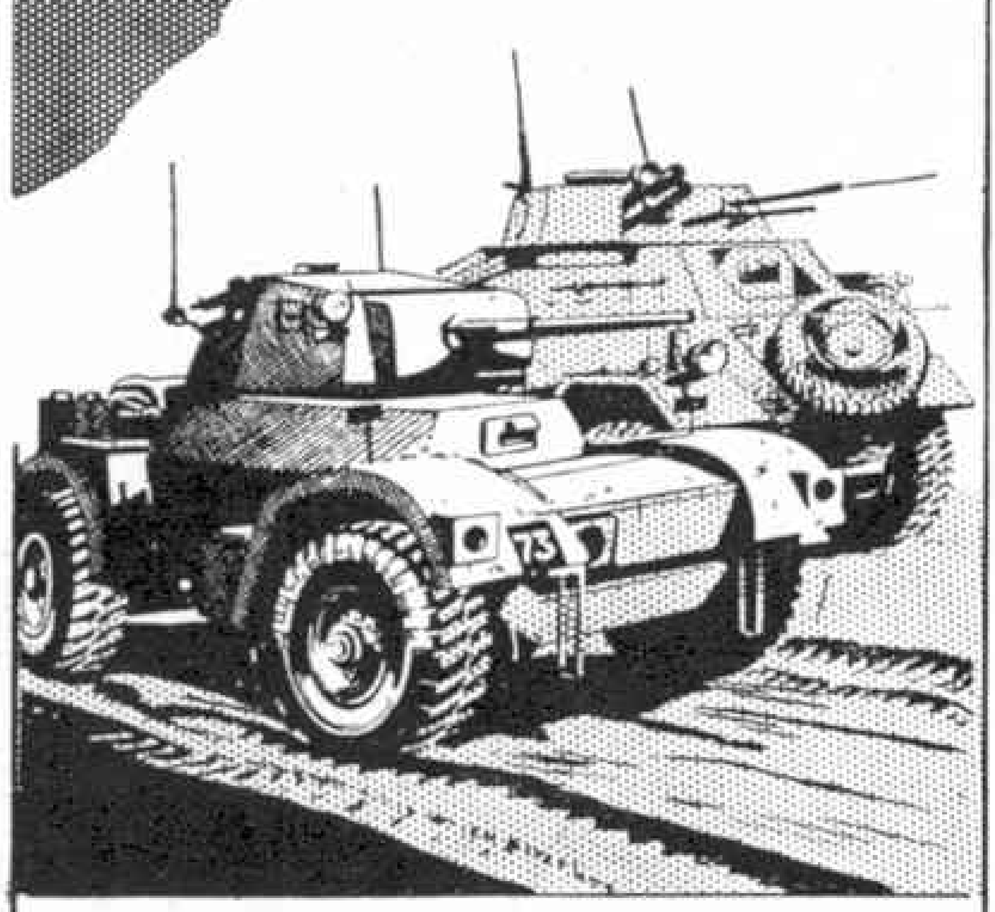

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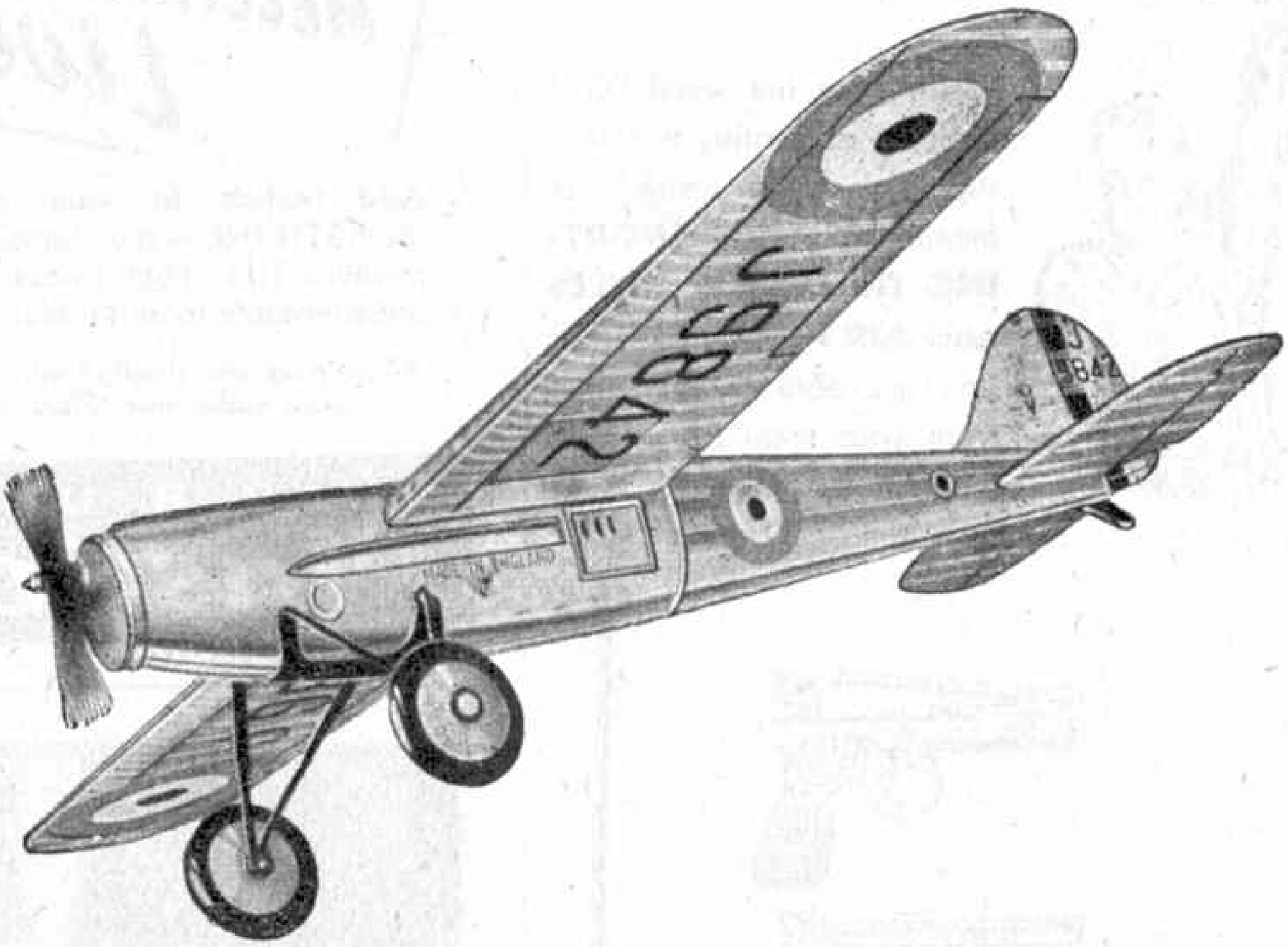

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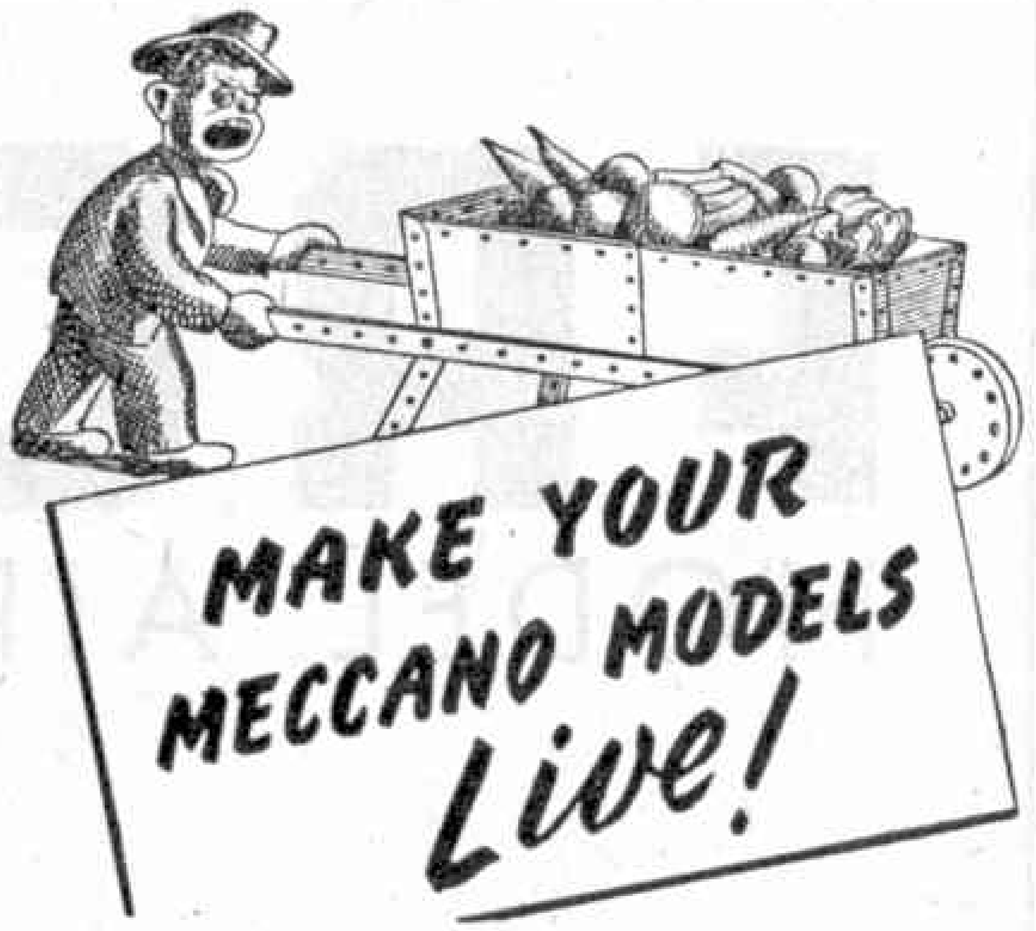

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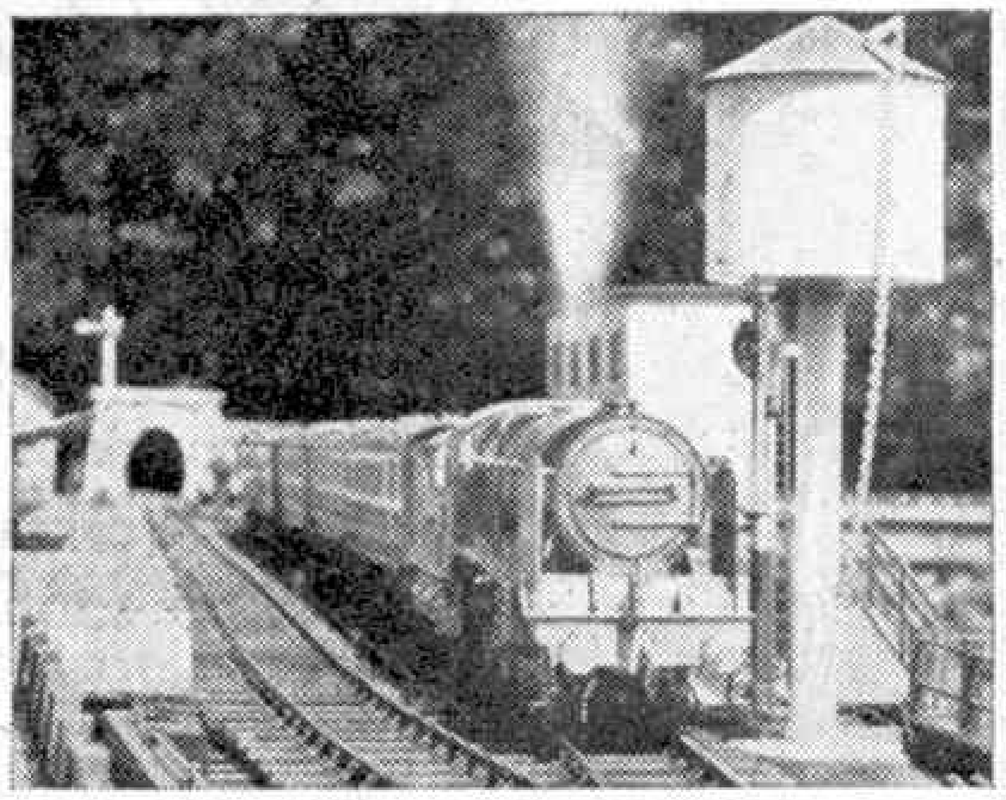

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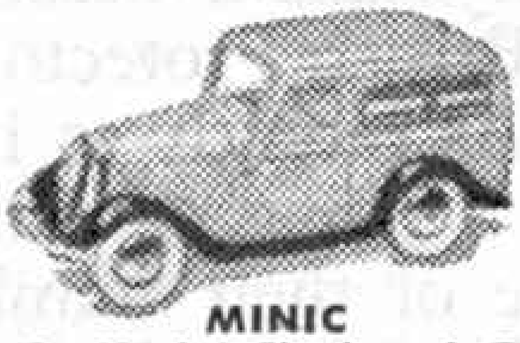

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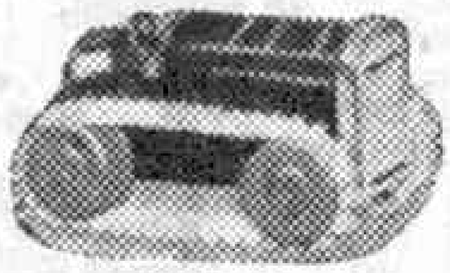

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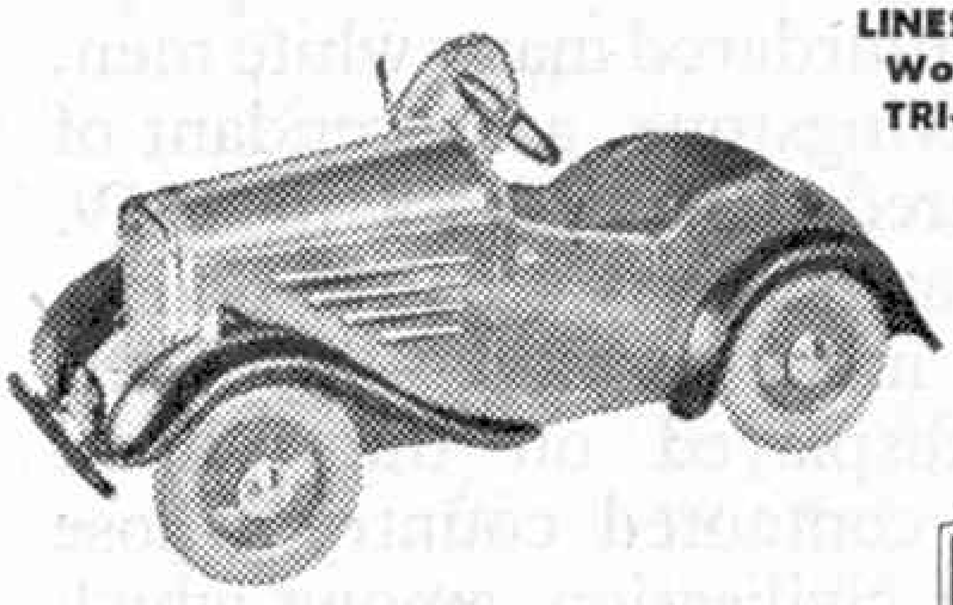

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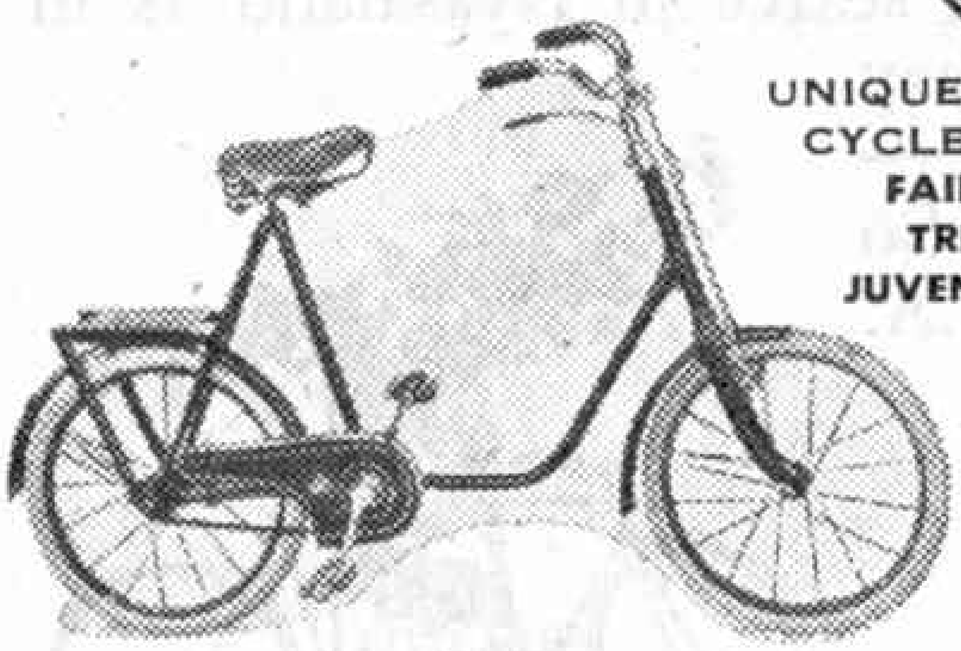

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NYASALAND

Much fierce fighting took place in Nyasaland before it became a British Protectorate in 1892. As recently as 1915 there was a rising of natives led by one of their number, John Chelembwe, who built a church and from his pulpit incited the natives to revolt. They murdered many white men, among whom was one named Livingstone, a descendant of David Livingstone who discovered Lake Nyasa in 1859. Before taking to his heels and being shot by a native policeman, Chelembwe preached one more sermon — with the severed head of Livingstone displayed on the pulpit!

The Nyasaland of 1945 is a contented country whose people appreciate the blessings of civilisation, among which B.S.A. bicycles take a high place. During the war in Europe, B.S.A. Bicycles were as scarce in Nyasaland as in Britain. But very soon now they will be available for everyone — which, of course, includes *you*. So keep in touch with your B.S.A. dealer!

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MECCANO MAGAZINE

Editorial Office:
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Vol. XXX
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August 1945

With the Editor

Camera Restrictions Almost Gone

My letters show that many readers are not yet aware that almost all the wartime restrictions on the use of cameras have been withdrawn. Scenes including bomb-damaged areas are no longer prohibited, and aircraft may be photographed. Almost the only remaining restrictions on land concern protected areas—which by now have almost disappeared—and certain prohibited premises that readers would not be likely to want to photograph. On sea, however, the prospects are still gloomy, for cameras are forbidden on British ships, except warships and Dominion vessels.

S.R. West Country "Pacifics"

The first three engines of a new S.R. locomotive class have just been christened. These are *"Exeter,"* *"Salisbury"* and *"Plymouth,"* and the remaining engines of the class will be named after other West Country cities and towns.

The appearance of a new class is always an event, but the coming of the "West Country" class, as this is called, is of special interest for two reasons. One is that they are air-smoothed "Pacifics," similar in general to the "Channel Packets," which have proved so successful. The other is that they are for use on the lines of the S.R. west of Exeter, where the "Channel Packets" and other giants such as the "Lord Nelsons" and "King Arthurs" are not allowed, as they are too heavy. The new engines have been specially designed to suit the tracks on which they are to run, and will provide ample power for all requirements.

Altogether 70 of these new engines will be built, and next month I hope to include a description of the class, with a photograph of the first of the series.

Harnessing China's Greatest River

China's greatest river, the Yangtse Kiang, flows 3,400 miles from the table-land of Tibet through mountain gorges to the plains of Eastern China, and it has been planned to harness its waters by means of a dam across a great gorge through which it passes near Ichang. The dam will be an enormous one, 800 ft. in height, and behind it there will be built up an immense lake or reservoir with more than twice the volume of that behind Boulder Dam in the United States. The water thus stored up will be used partly for irrigation and partly for power production, and it is estimated that it will yield as much hydro-electric power as is produced by all the dams yet built for this purpose in the United States. Moreover, this is only one of several schemes that engineers already have in mind. Another dam is suggested on a large tributary, while farther north there is the great Yellow River to be harnessed and tamed.

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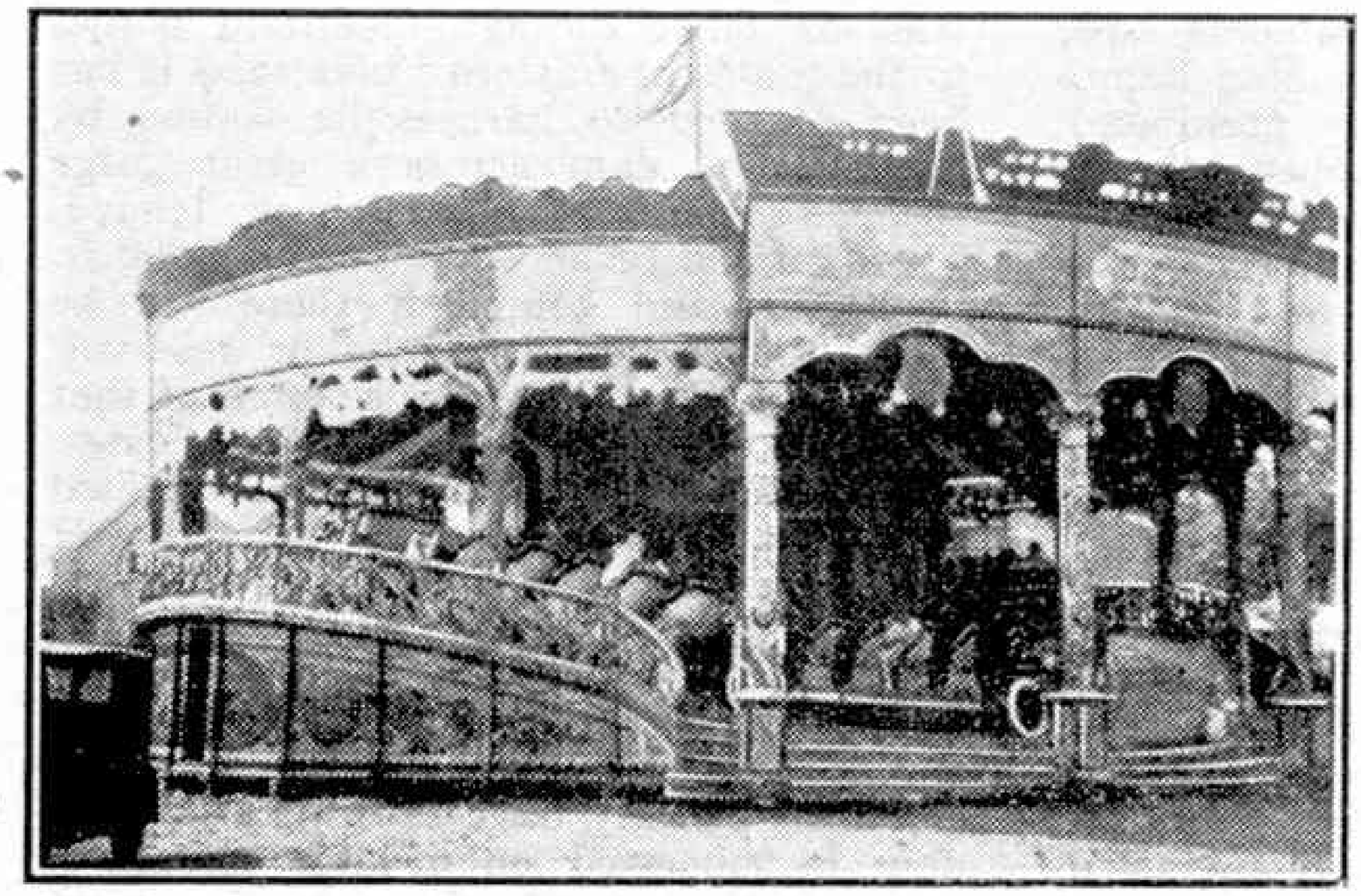
More Fun Of The Fair

The Story of Old Time Roundabouts

By G. A. Tucker

THE engineering side of the fairground of olden times is fascinating. The "*World's Fair*" newspaper recently unearthed the fact that the first known application of steam to a roundabout was made by S. C. Soame of Marsham in 1865. The power unit took the form of a double high-pressure cylinder portable engine, and the drive to the roundabout centre was by a flat belt. Shortly afterwards it was at work at a fair at Aylesham and was probably seen by Frederick Savage, who developed the idea. Early steam roundabouts were known as "steam dobbies." They had neither a platform nor a galloping motion, and the type, which had its last days in Oxfordshire, is now extinct except on hand machines for children.



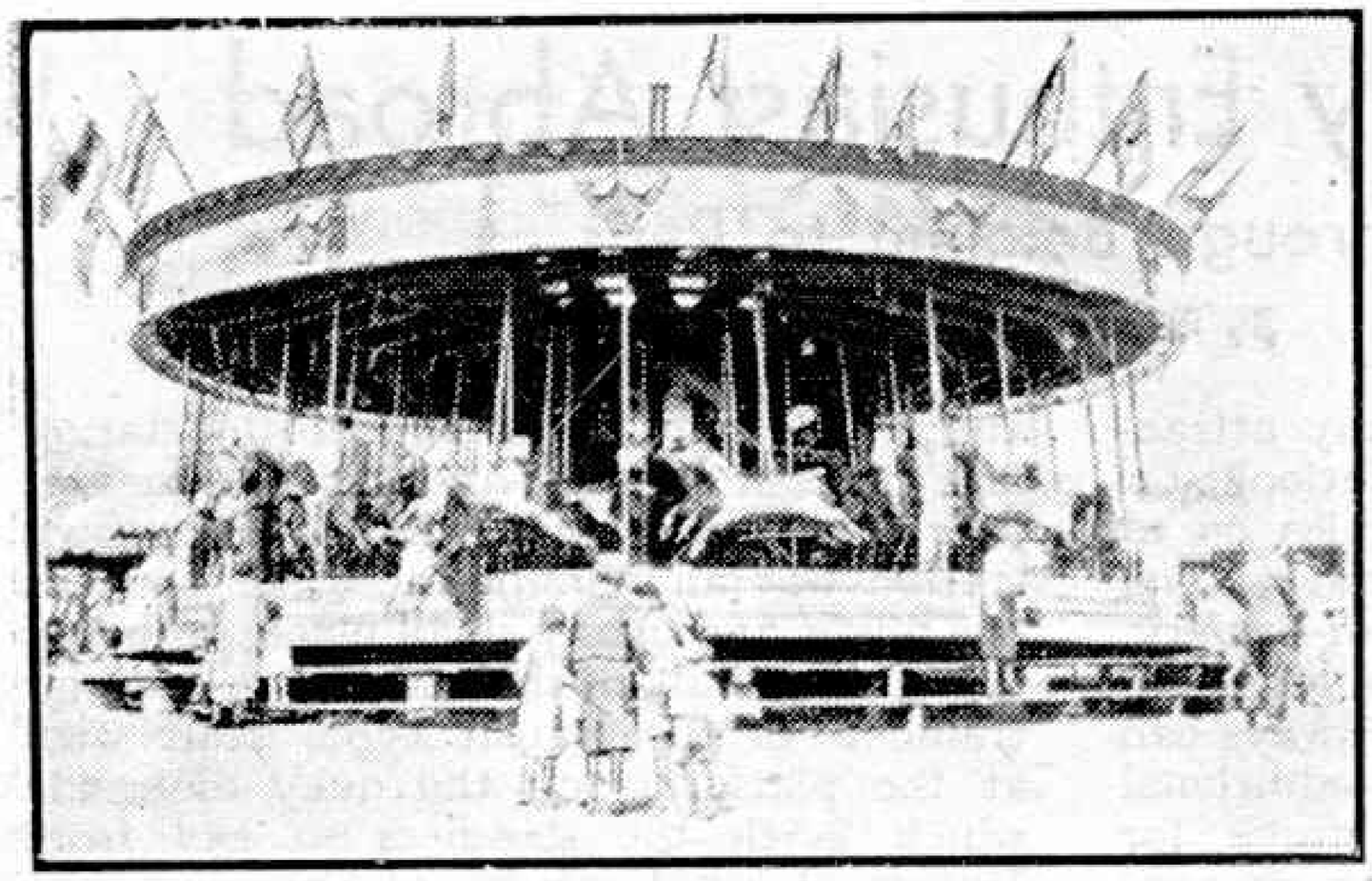
An electric Scenic Railway built in 1920 by Savage Brothers Ltd. Each of the eight "cars" carries an electric motor, driving flanged wheels, on a railway type track. The road wheels of the cars are dummies. Photograph by courtesy of Mr. P. W. Bradley.

As mentioned in Mr. Yarham's article in the April "*M.M.*," Frederick Savage became Mayor of King's Lynn in 1889–90, and all the new ideas for rides were tried out at Lynn Fair. The firm built its first three-shaft traction engine in 1875 and entered the roundabout industry soon afterwards. At that time roundabouts were still very small, and pushed round by hand or ponies, and I have even heard of roundabouts on the Continent being propelled by boys in a turning loft. Savage's idea of driving by a traction centre engine caused roundabouts to be made larger and more elaborate. One of his earliest was called the "Channel Tunnel Railway," in which a steam locomotive hauled three carriages around a circular track, either on ground level or on trestles. Half of the track was covered by a tarpaulin tunnel, and there was an organ on a truck in the centre. The track was of 2 ft. gauge and about 50 ft. in diameter.

John Fowler and Co. of Leeds made two channel tunnel railways in 1895, one known as "*The New Mersey Tunnel Railway*," with a locomotive called "*The Pioneer*," and the other as "*The London, Chatham and Dover Tunnel Railway*," with an engine of the name of "*Knockalong*." The locomotives of Savage's tunnel railways were of 2–2–2 "tank" type with radial axles and outside cylinders, and they ran clockwise round the track. The carriages had four wheels and part of the track was laid on a truck to avoid having to lift the locomotive by crane. Another form of roundabout by Savage was the "Sea-on-Land," in which eight boats were towed around a circular track by a towing frame driven by a steam engine of the switchback type. The boats had masts and sails, and were carried on wheels that had a Savage "patent" rocking motion.

Steam switchbacks came in the 1890s, and were made and developed by Savage, and later by other firms now extinct. The first were of the "spinning top" type, and the second were described as "standing top," names that in themselves are descriptive. Both usually had eight cars, which were elaborately carved gondolas. A "spinning top" had 16 sections and was similar in construction to the galloping horses roundabouts. The cars were towed round by pillars and rods that were well braced and heavily decorated with fluted brasses. In the "standing top" the "house" was a fixture, with a track of two hills and two valleys subdivided into 36 sections. In this type the cars were towed around by an eight-sided towing frame socketed into the centre drum and stayed to a rotating sleeve on top of the chimney of the engine. Both types had a longitudinal locomotive-boilered engine mounted on a truck, which had wooden road wheels. The organ was on a pedestal on the off or right hand side of the fire-box, and the chimney was also the centre pole. Many "standing top" switchbacks were later converted to electric scenic railways by removing the engine and fitting rails with motors in the cars. The engines for switchbacks were of the two-cylinder type, of 5 h.p. for the lighter machines and 6 h.p. for the heavier ones. The cylinders were on the fire-box and the flywheel and inclined feed pump with eccentric rod on the offside. The organ on its separate road truck stood on the ground on the offside of the engine truck.

Savage first produced the switchback in Leeds, and it was not a success owing to derailments. These were a problem until Savage brought out the "compensating rail" to effect a cure. In all switchbacks and scenics there are three rails in the track, and the car wheels are radial axled and spaced to one of two gauges, about 2 ft. 2 in. for the front wheels and 2 ft. 7 in. for the back wheels. The outer wheels of the axles use the outer rail, while the inner wheels of the front axles on the cars are on the middle rail and those of the back axles on the innermost rail. The middle or compensating rail is not at the same level as the two outside rails. The variation is 3 in. above or below, and the middle rail is lowest when ascending hills and above the outer rails on the descents. At the tops of the hills and the bottoms of the dips this rail is at the same



A fine Savage roundabout with four horses abreast, on Hampstead Heath.

level as the main ones.

Switchback cars were shorter than those of scenic railways, and safety nets or cloths were arranged over the coupling rods between them. These cloths were sometimes neatly embroidered. Gondola cars had front or back seats separately hinged on, to fold up when on the road. As the scenic cars were longer, they were more closely spaced and no nets were used. The obvious idea of a "spider" frame to centralise the track with the centre engine was not thought of until the Orton and Spooner Scenic Railways came out in the 1920s. It must have been a difficult matter to set out a 50-ft. diameter track centrally around the engine, an idea now standard in all modern rides.

The first motor cars in steam switchbacks were a speciality of Savage Bros., and were based on the road cars of 1906. It was J. W. Waddington, a Yorkshire showman, who introduced these. He hit on the idea because of public curiosity aroused by his car on the fairground, and substituted motor cars for the gondolas that up to then had been popular. J. W. Waddington is believed to have been the first showman to run his own car. The usual railway wheels and underframes were fitted to the cars of these switchbacks, which rarely had sprung axle boxes, but dummy rubber tyred road wheels and mudguards were attached on hinged arms outside the car bodies, and these and the bonnets were removed for stowage. Dummy lamps and steering wheels also were fitted.

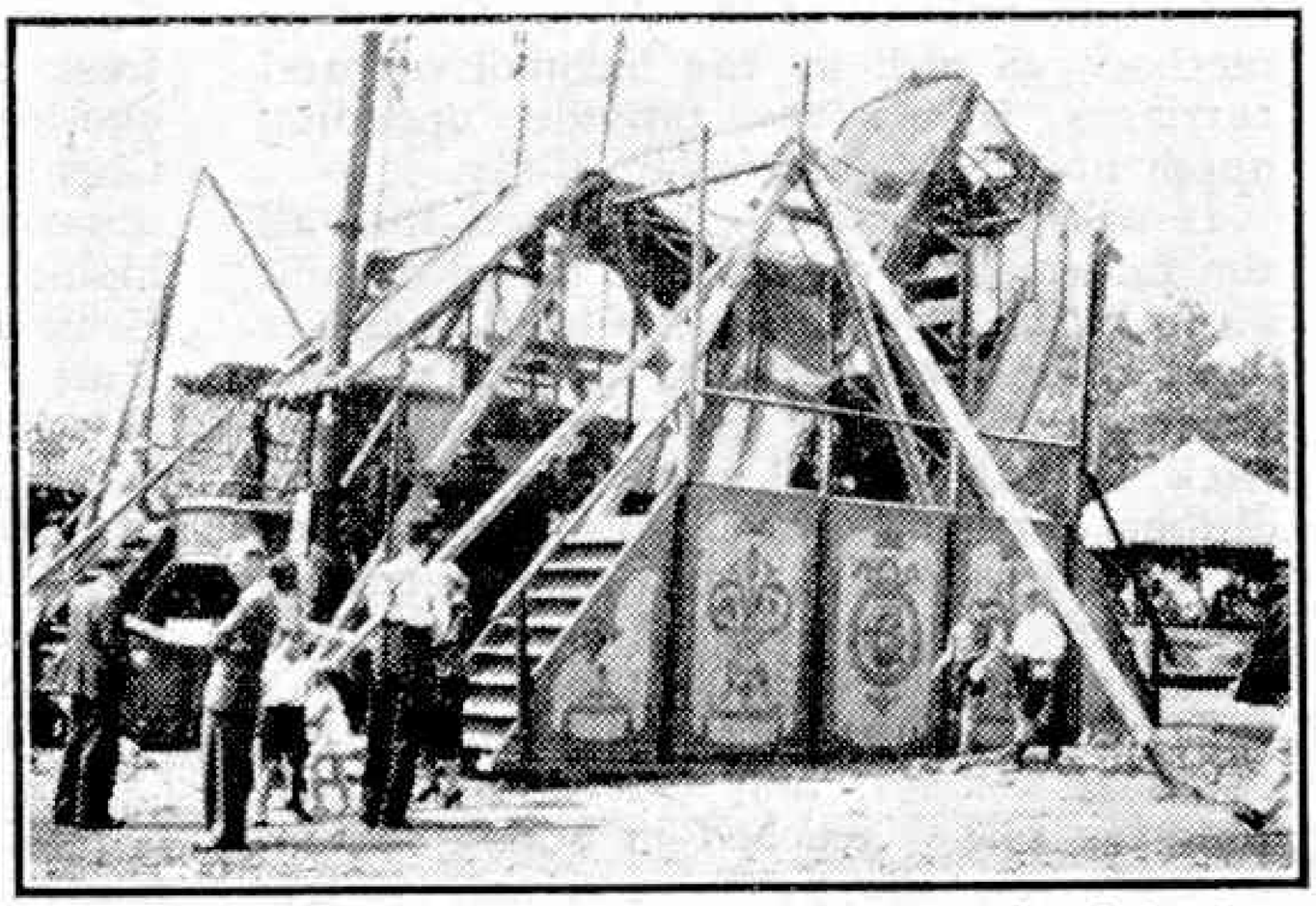
Another speciality of Savage was electric light engines. These were popular in cinema shows and also illuminated some early switchbacks; they were mounted in horse-drawn wagons, as traction engines were not so reliable in earlier days as in the later 1890s. Horse haulage was used extensively by many firms. Eventually paraffin flares gave way to electric lights, first arc lamps and later large bulbs as to-day, but some writers on fairground history think the older lighting superior to that used now. The firm also made the necessary transport trucks and caravans. Few of the original transport trucks now exist, other than the "centre" trucks for gallopers and switchbacks. Most of those with the original bodies have had old lorry wheels fitted, with rubber tyres.

The bicycle roundabout also was made by Savage. This consisted of a circle of tandem cycles in which riders pedalled themselves around, and is now rare. Yet another Savage speciality was the steam yacht or swingboat. There were really two huge boats in each set, seating about 30 persons and actuated by a steam engine. The first set of steam yachts was built by a Mr. Cartwright, who patented the contrivance, and the engine was by Robey, of Lincoln. It is interesting to find that only one "single boat" steam yacht exists, belonging to F. Berry, of the Cheshire area. The engines of steam yachts were of 8 h.p. and larger than those in switchbacks. Savage made yachts and engine complete, but Robey's probably made replacement engines with Savage woodwork. The Cartwright patent was for the reversing motion, which could be applied to any make of boiler and cylinders.

Of all Savage's fairground achievements his greatest and best known was the steam galloping horses roundabout. The earliest steam gallopers by Savage were not operated by overhead cranks. They were known as "flat" or "platform" gallopers, having 12 sections to the circle, with 12 pairs of wooden cart wheels under the floor carrying the load, and galloping gear operating 12 sets of three-abreast cockerels or horses. The sets of three were arranged above the wheels, and slots in the floor allowed galloping rods fitted under the animals to be connected to axle cranks or eccentrics. Splashers concealed these wheels, which ran on a circular tramway on the ground. Centre engines were then longitudinal in type, like those of switchbacks, and the spinning top had 12 sections. Six vertical towing pillars well braced by diagonal rods drove the floor in a clockwise direction. The floor steps were only half a bay wide, the other half of each bay being taken up by the wheel splashers.

Only one platform gallopers machine is believed to be still in existence. This is a ride known as "Prime Porkers and Waltzing Balloons," which went to Ireland in 1937. In this unique machine, which formerly travelled in the Midlands, the top revolves in the opposite direction to the floor. It has four revolving circular cars or balloons and eight sets of three pigs abreast. Most of the rides had horses, handsomely carved and painted, often with names on them.

Overhead crank action horses are believed to have been the invention of J. Berry, a Liverpool showman.



Another Hampstead Heath fairground picture, showing twin steam swingboats.

A Railway Enthusiast Abroad

I.—Through Belgium to Paris

By R. A. H. Weight

FOREIGN travel presents many attractions. It broadens our outlook on people and things, and it enables us to see, and to describe to others, many novel fascinating features in the way of scenery, architecture or vegetation. In addition, those of us who are keen on railways can find innumerable sources of additional interest on the Continent of Europe, for instance, from the long-distance express, steam, electric or diesel, to the quaint wayside freight train or the narrow gauge mountain railway of the Alps. Operating methods as well as the locomotives and carriages themselves provide unending opportunity for interesting study.

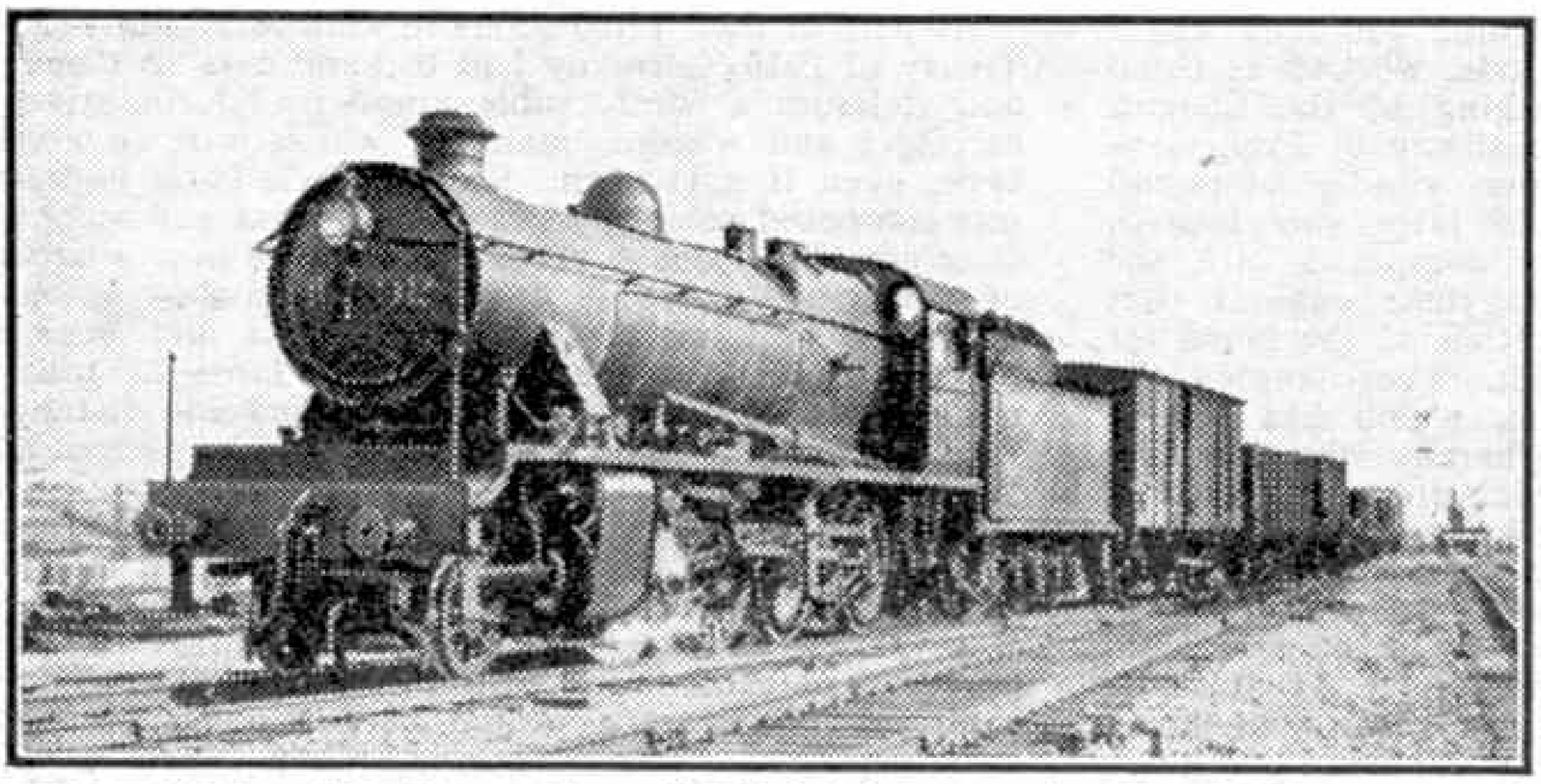
Compound 4-6-0 locomotive No. 721 of Class "7" of the Belgian National Railways. Photograph by C. R. L. Coles.

It will of course be understood that all the information on railway travel abroad given in these articles refers to the happier days before the outbreak of the present war. One or two of the reminiscences go back to hard travel under Service conditions during, or just after, the conflict of 1914–18, though most of the travels described took place in the peacetime conditions of the next 20 years.

On a lovely summer morning during the 1920s at Ostend, that Queen of Belgian watering places reached in about 3½ hrs. from Dover, the promenade and yellow sands were gay with coloured beach garments or sunshades; but my colleague and I had to make our way to the station and proceed inland—another Continental tour by train was beginning. The town station was an unimposing affair such as one might find in any small place, probably because the bulk of the main line passenger traffic is of the transit type, dealt with at the platforms on the quay alongside which berth the steamers to and from Dover. A good service of expresses was run over the 76 miles to Brussels, some conveying through carriages or sleeping cars to Germany, Italy, Switzerland, Austria or the Balkans. We had left behind our British islands, from which all surface travel to other countries must begin by a sea trip. We were on the mainland of Europe, and between countries there were only land frontiers past which the same vehicles may travel for upwards of 1,000 miles.

Proceeding by stages along the line to the capital, our first halt, reached in a local composed of four-wheelers hauled by a 2–6–0T, was quaint old Bruges with its famous Belfry Tower and its cobbled walks lined with trees and Flemish half-timbered houses overlooking ancient canals. Then on to Ghent, where plans were on foot to improve the layout of the tracks to allow high-speed running throughout between Brussels and Ostend behind specially built "Atlantics," or streamlined 4-cyl. "Pacifics" in later years. The journey was continued to Brussels Nord station by fast train, 4–6–0 hauled; at that terminal most of the main Belgian services were concentrated under the direction of the Belgian National Railways Company which had absorbed many smaller concerns.

Belgium is a small country, densely populated in the centre and west, with many towns close together and heavy traffic. It owned British-built locomotives and presented several English-like

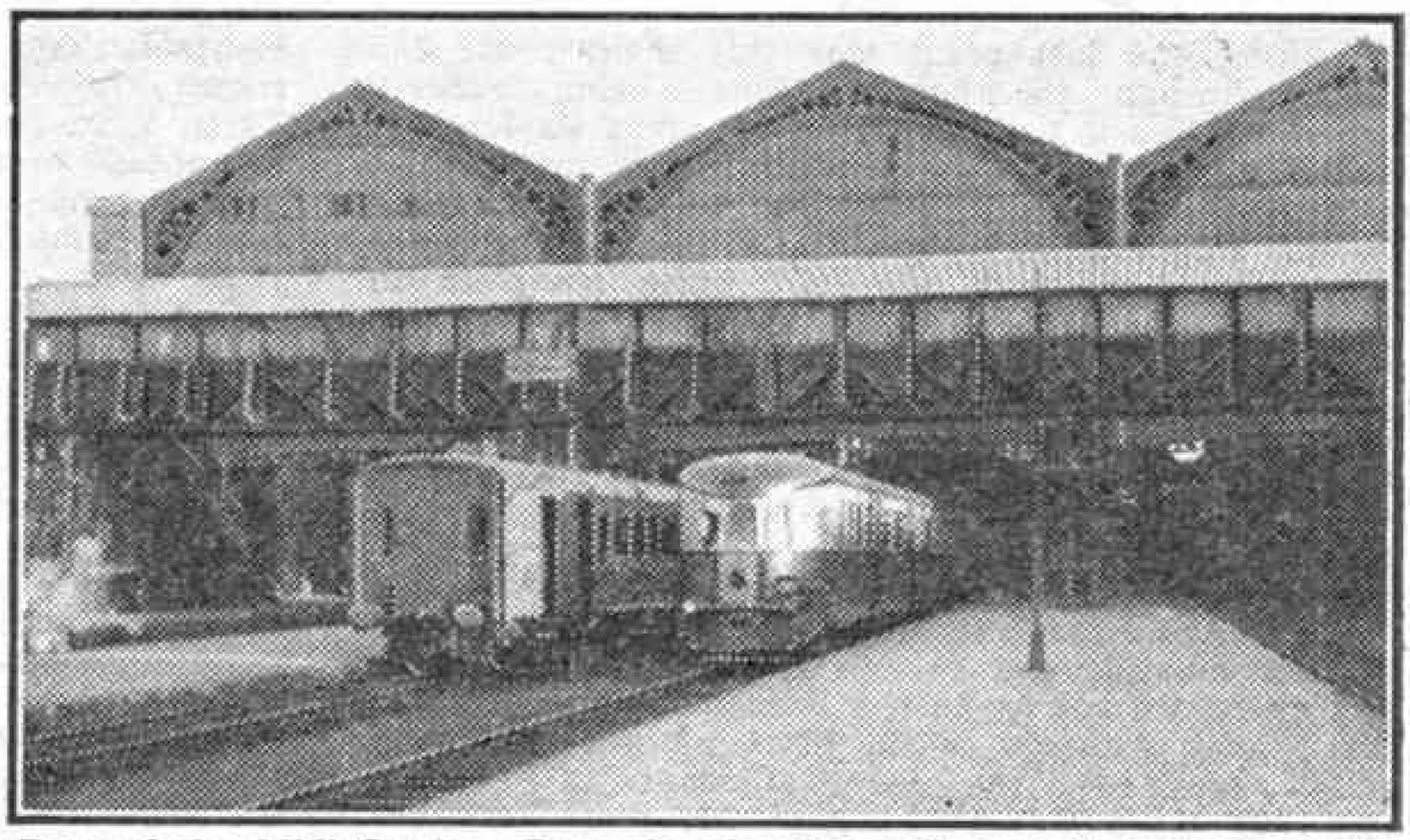


Belgian National Railways Class "31" 2-6-0 locomotive No. 3192 on a goods train in Bruges. The engines of this class were built by Armstrong-Whitworth Ltd. in 1922. Photograph by C. R. L. Coles.

railway features such as "Somersault" signals, gradually replaced by upper quadrant semaphores, though some had three positions, corresponding rather with the red, yellow and green of colour light signals here, that were interlocked with points; and also power-operated distant signals. When I was last there the tracks as renewed consisted of flat-bottomed or Vignoles steel rails in 18-metre lengths weighing 100 lb. per yard. In Britain bull-headed rails are standard. These are the same shape top and bottom and rest in cast-iron chairs bolted to the sleepers. Overseas the flat-bottomed rail is almost universal; its much wider and flatter base is carried by either a cast-iron or steel soleplate spiked to the sleeper, or, on some lines, fixed directly to the sleepers. On the main lines of Belgium and France, as elsewhere, the flat-bottomed track in a good state of maintenance provides exceedingly comfortable travel in modern bogie vehicles.

As much as 100 years ago a Belgian named Walschaerts invented the locomotive valve gear which in an improved form is largely used in Britain and nearly all over the world to-day, though it is only comparatively recently that it found favour on a larger scale here. Belpaire, who first designed the square-topped outer fire-box bearing his name, now in common use, also was a Belgian. His original plan, in conjunction with much smaller boilers than are now usual, was to have a wide grate jutting out on each side of the rectangular upper section.

To return to our tour, a trip from Brussels to the great port of Antwerp and back revealed that busy four-track 27½ miles to be as interesting as usual. There were many fast local services known as *"Trains Bloc,"* that is set trains of limited carrying capacity by which certain cheap tickets were not available. These were worked by outside-cylindered six-coupled tender or tank locomotives. Through expresses between Amsterdam and Brussels and Paris, including all-Pullman flyers in more recent times, traversed this line, two tracks of which were electrified in 1935 on the overhead system. Even so, as part of the intensive passenger service, diesel railcars were operated, as well as quick two-coach steam stopping trains hauled by an old express locomotive. There was plenty of goods traffic too through this industrial region. In 1939 the slow roads were electrified, with colour-light signalling extended on the route. The principal intermediate station is Malines, the seat of an Archbishop; in the tower of the Cathedral there, visible from the line, is a very fine carillon or group of large bells on which tunes can be played.

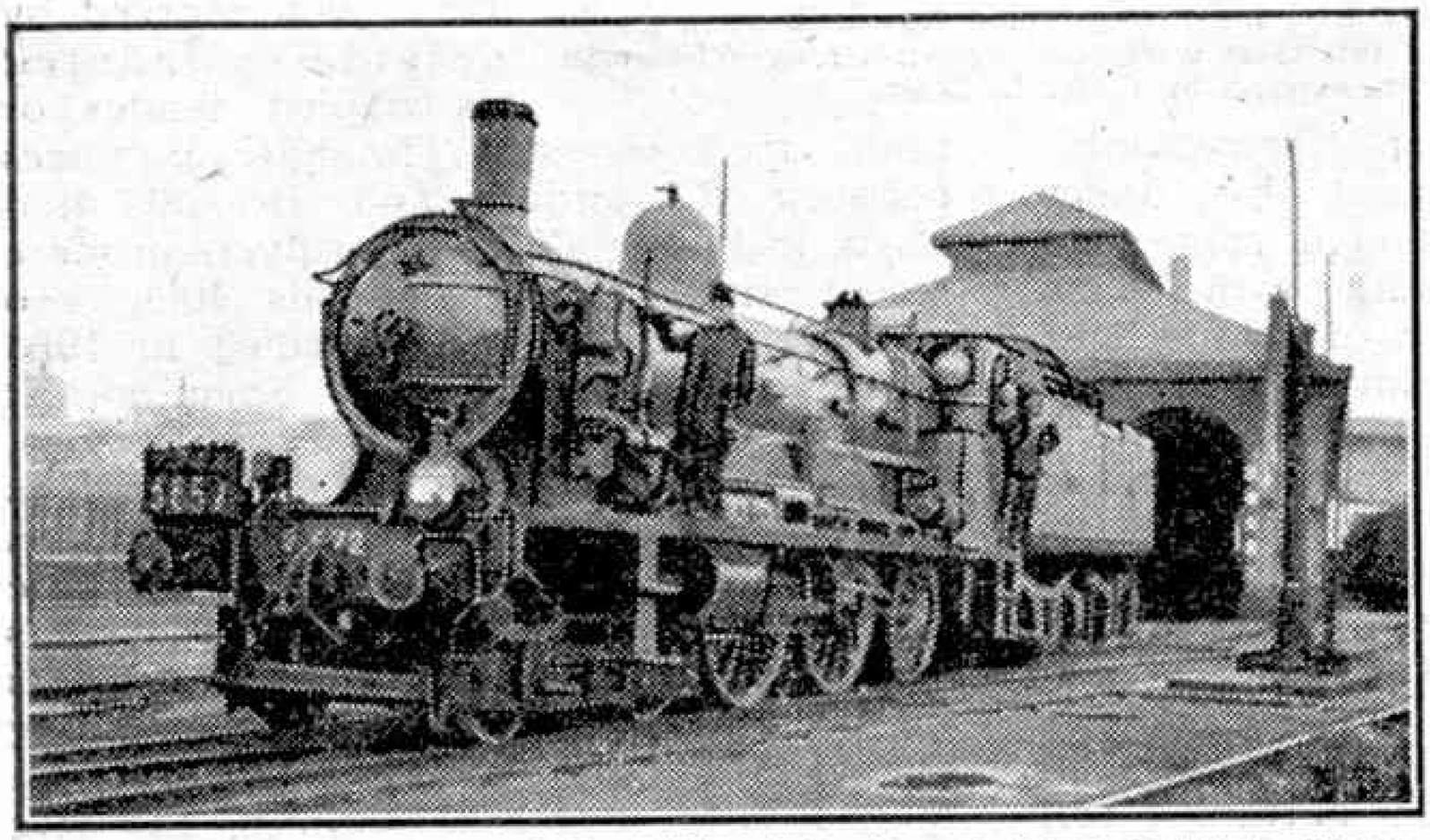


Part of the Midi Station, Brussels, showing railcar and ordinary steam stock. Photograph by G. O. P. Pearce.

Netherlands locomotives worked into Antwerp.

Next we were off to Paris, so we went to the Midi Station which has recently been connected to the Nord lines in Brussels by a long contemplated inter-city

viaduct spur. Our express weighing 290 tons was a non-stop between the two capitals, worked as usual by a French locomotive belonging to the Chemin de Fer du Nord or Northern Railway of France, as it then was. It was one of the four-cylinder compound "Atlantics" built in 1902, and later superheated, but looking a little antiquated compared with the "Pacifics" of the day. It was these engines that first created the notable reputation of the Nord for high speed and reliable running. They employ the De Glehn compounding system, which has proved so successful for many years, whereby when running steam is taken by the two high-pressure cylinders from the boiler in the ordinary way, and then passed through a receiver into the larger low-pressure cylinders, where it is used again as a driving force, at reduced pressure of course, before being exhausted through the blast pipe and chimney. At starting, or when necessary, the driver can admit live steam to the low-pressure cylinders direct, so working the engine as a four-cylinder simple, but this involves a heavy drain on the boiler and is not encouraged for longer than is essential.



"Atlantic" 4-cyl. compound No. 2672 of the French Nord Railway. Photograph by O. S. Nock.

During the last great war this main route ran right through the fighting lines, being entirely destroyed for a long distance: A great deal of rebuilding was afterwards necessary, as in many parts of Belgium and France, with the help of the British Royal Engineers. When this journey took place the restoration work was not quite complete in Belgium. In consequence cautious running was necessary for a considerable distance, as well as a crawl over an underbridge under reconstruction, then on through a short tunnel where single line working was in force, thus necessitating two virtual stops to allow a pilotman to board the engine and then alight. As a result we took over 53½ min. to cover the first 37½ miles to Mons, where the British Regular Army made its heroic stand in 1914.

After crossing the French frontier near Feignies, 49¼ miles, we got on to the French main line of the Nord near Aulnoye, when little more than "even time" remained if the overall allowance of 215 min. for 192¾ miles was to be kept. It most certainly was, notwithstanding a long relaying slack, as for more than 100 miles speed remained between 56, at the top of a 1 in 200 rise, and 74 m.p.h. continuously, thus demonstrating that, like their 4–4–2 sisters on the L.N.E.R., these "De Glehns" still had plenty of "go" in them! As soon as the Belgian tracks were fully resettled this schedule came down to 205 min. as the prelude to further remarkable quickenings before 1939 that put the Nord in the forefront of European long-distance speed achievements.

As part of their reparations in kind after the Peace Treaty of 1919, Germany had to hand over to France and Belgium a considerable number of locomotives, carriages and wagons, many of which were of good type, even if part-worn. Our Brussels-Paris express was composed entirely of ex-German first and second-class corridor coaches. It is the practice in a number of countries to provide first and second-class accommodation only on most of the fastest and busiest expresses, but as the second-class fares in many cases were less than third for a comparable distance here, second-class in Europe was much patronised and in general use.

Between Mons and the French frontier we had passed over one of the scattered sections of the independent Nord Belge or Belgian Northern Railway, really an extension of the French Nord and operated in accordance with French practice. Their principal engines were painted Nord colours, chocolate brown. They were 4–6–0 four-cylinder compound "De Glehns," or rather remarkable 5 ft. 1 in. 2–8–0s having the same propulsion. The latter were used quite a lot for passenger trains, as were the very big Belgian National 2–8–2 5 ft. 7 in. mixed traffic locomotives, which proved invaluable over the heavy gradients of the Ardennes. They have two outside cylinders no less than 28¼ in. diameter, the stroke being of the same dimension. Their predecessors were less large but quite notable two cylinder 2–8–0s built mostly in England.

All the European main lines are laid to our standard gauge of 4 ft. 8½ in., except those of Spain and Portugal, where the gauge is 5 ft. 6 in., and Russia, where it is 5 ft. The standard lines have the advantage of a larger loading or clearance gauge than in Britain; engines can be built up to a slightly greater height and can have the large outside low-pressure cylinders commonly employed with compounding, while many of the carriages are more roomy, because the maximum allowable width is 10 ft. 2 in. compared with 9 ft. 2 in. here. It will be noted that there is always very considerable overhang on each side beyond the axle gauge. The corresponding limits of height are 14 ft. 0½ in. and 13 ft. 6 in.

Compressed air brakes of the Westinghouse type are used for all passenger and freight trains in the countries under review, except Spain and Portugal, where it is believed the automatic vacuum as general in this country is still in use. With the latter a vacuum is created in the train pipes by means of a steam ejector on the engine; a handle lowered by the driver or guard destroys the vacuum and applies the brake throughout the train. The Westinghouse brake is operated by air compressed by a steam pump on the engine and supplied under pressure through the train pipe, so holding the brakes off. When the brake lever is applied, air passes from the auxiliary reservoirs to the brake cylinders and so causes the brake blocks to go "on" with great force.

There were five principal French railways radiating from Paris. In each case after clearing the complex groups of tracks on the outskirts, these systems led to different parts of the country and each had its large area all to itself. That is to say for the most part there was no competition, nor were alternative routes provided. The same may be said of Europe as a whole, since there is so much State control of railways. Air and road competition were present, however, and to the (*Continued on page 286*)

Photography

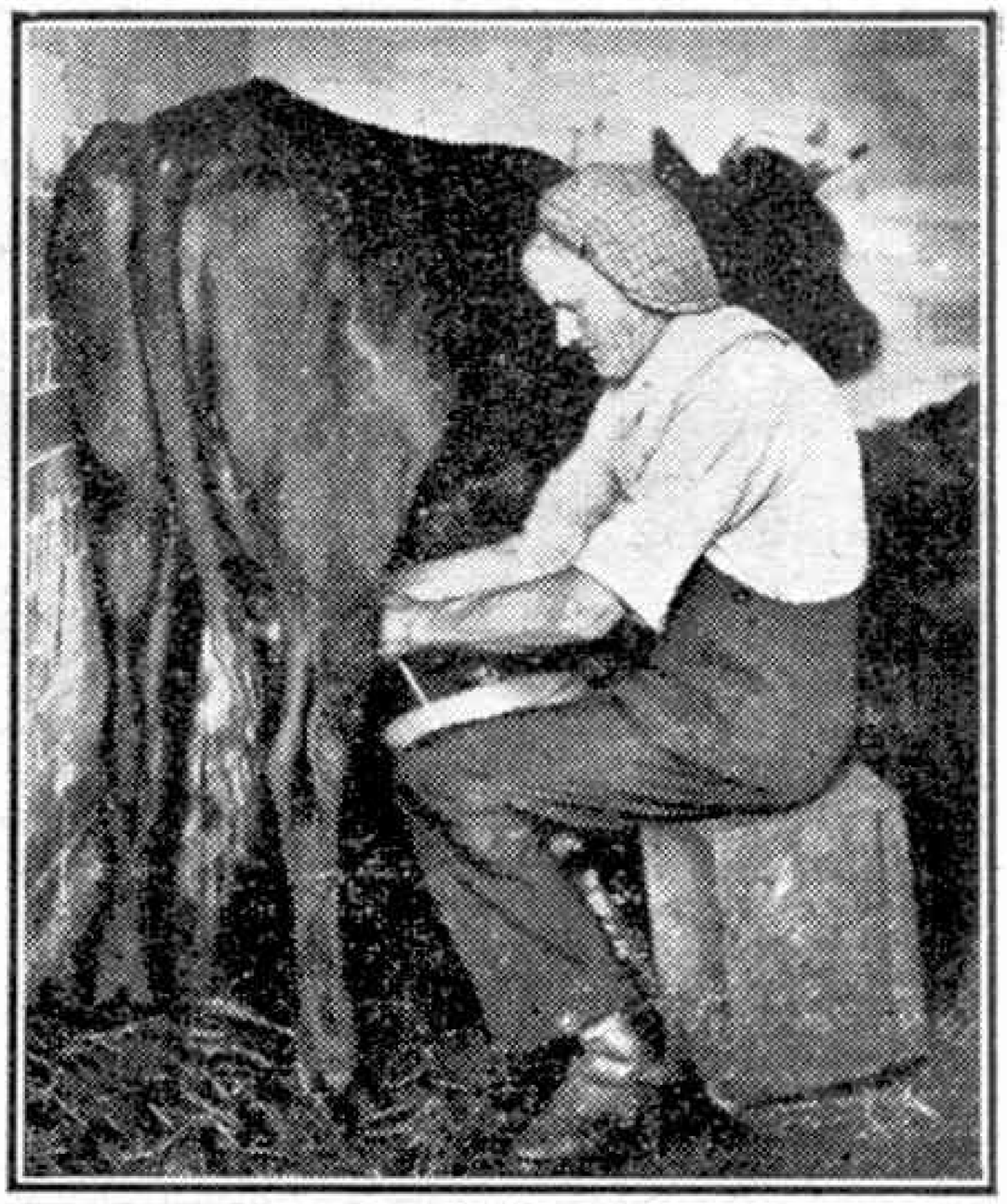
Down on the Farm

By E. E. Steele

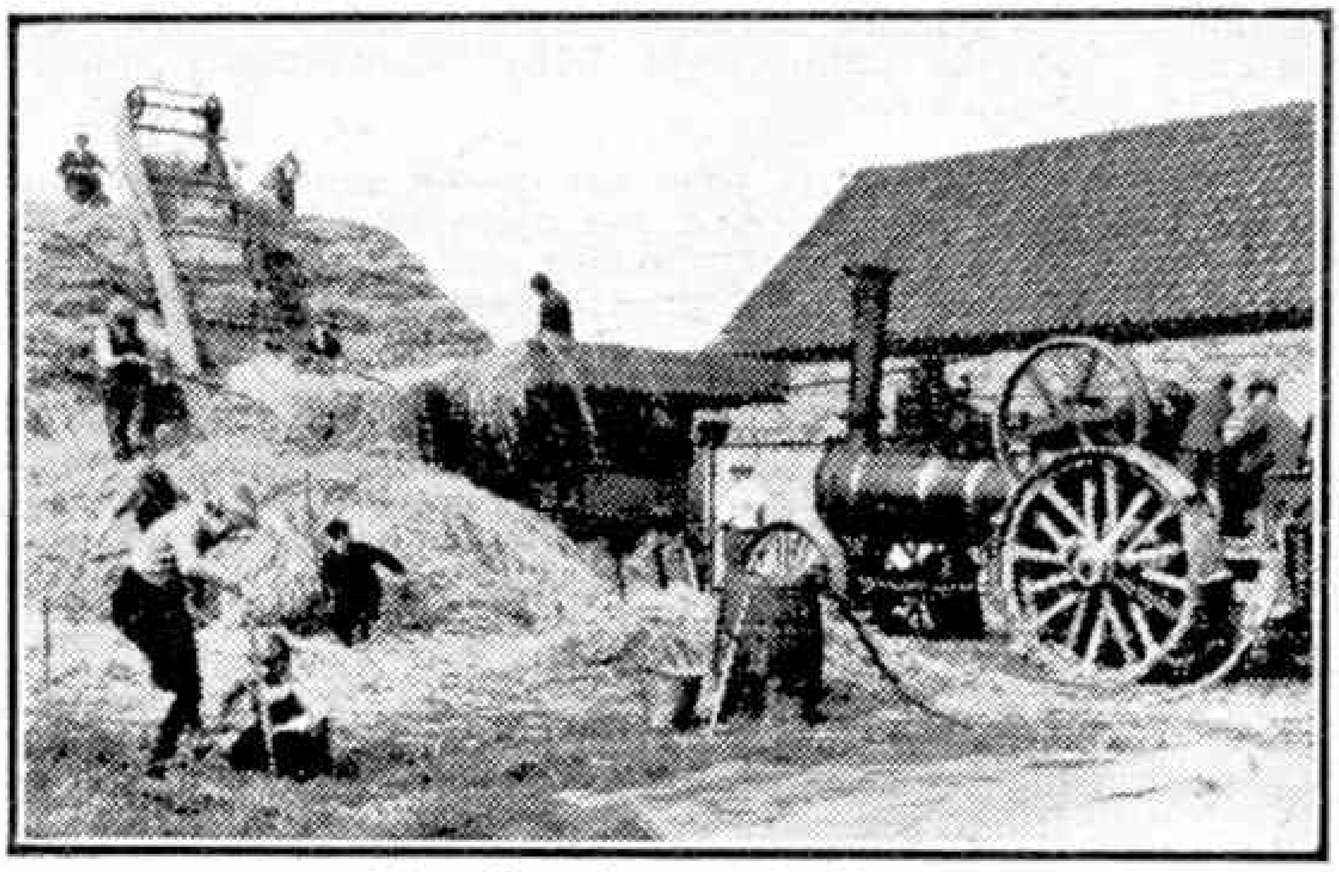
AUGUST is a month which always conjures up memories of holidays. Many people prefer the seaside for a holiday, but the farm is my choice, as there is so much in which to be interested when one is an enthusiastic photographer. A stroll round the farm always brings fresh discoveries, and more and more interesting things to take, and I find myself making lots more exposures than the shortage of film justifies.

Hundreds of boys have given up some of their Summer holidays during the war in order to work on the farms and assist in gathering the all-important harvest, and this work is still vital if the supplies of food are to be maintained. What a grand opportunity for the boy who has a camera, and a spare film or two, to bring back some interesting pictures of the people and animals he has met with during his stay on the farm.

There are so many subjects on the farm that one is tempted to fire off all the film in rapid succession, but it is best to look around first, and then concentrate on a few chosen shots. A distant view of farm animals in a field may look alright to the eye, but may be very disappointing in a photograph. Close-ups are usually much better.



Milking Time.



Threshing day on the Farm.

If the farm people are your friends, you will probably want to make some pictures of them, but do not let them pose in their Sunday best. Snap them when they are doing their ordinary jobs about the farm, and they will be much more natural and at their ease.

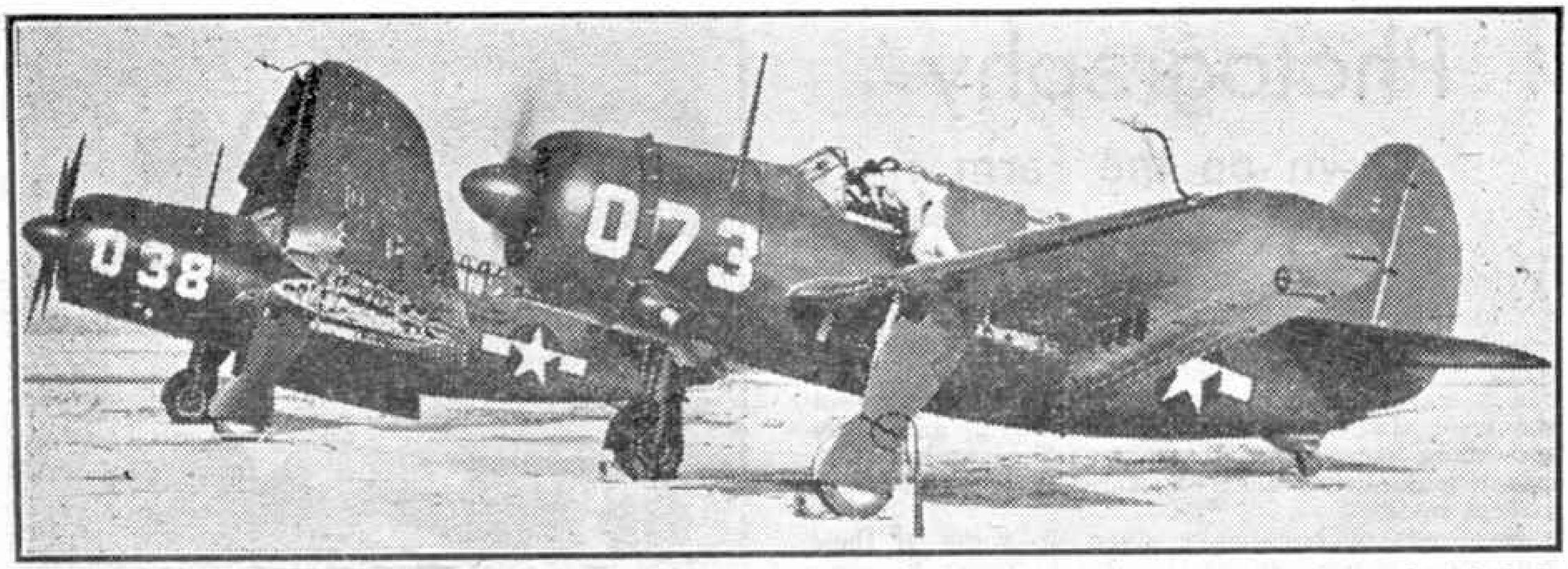
August is the month when harvest is getting into full swing, and one could make innumerable shots of farm-carts and all the activity in field and yard at the height of the farmer's most important season. On the other hand a simple shot of a few ears of corn against a nice background of sky can make a very satisfying picture, symbolical of harvest.

Later in the year there is threshing time on the farm, when the big engine arrives, with its threshing drum and straw-baler in tow. One of the pleasantest sounds of the whole countryside is the distant drowsy hum of the threshing engine, wafted over the fields. In the yard the scene is one of intense activity, and the machine whirrs away, devouring the huge stacks and filling the sacks with golden grain. Here the boys like to gather, armed with sticks to kill the rats and mice as they flee from the rapidly diminishing stack, which has been their warm and comfortable quarters since the cold winds of Autumn drove them from the fields to the shelter of the stacks and the benefit of a regular food supply. In the intervals of rat hunting the boys like to climb up the tender of the engine and learn a few secrets of its working from the patient driver.

In planning your farm pictures keep in mind the possibility of making up an album that you will be proud to show to all your friends, and which will provide you with a memento of a happy holiday.

One thing should always be remembered. You are almost certain to promise prints of your pictures to some of your friends on the farm who have helped to make them. Be sure that you keep your promise to everyone. If by chance a picture is a failure, write and tell your friends what has happened.

A harvest design.



The Curtiss SB2C-4, newest version of the U.S. Navy's "Helldiver" dive-bomber. It carries a heavy bomb load, and has eight 5 in. rockets under the wings. Photograph by courtesy of the Curtiss-Wright Corporation, U.S.A.

Air News

New British Single-Seat Fighters

Some details of three new types of British aircraft have been released. One is the Westland "Welkin" single-seat fighter designed for operations at very great heights and said to be one of the highest flying aircraft of its type. It is rather like the "Whirlwind" produced by the same firm, and with a wing span of 70 ft. is one of the largest British fighters. The "Welkin" is armed with four 20 mm. British Hispano cannon, and has a pressurised cabin with a heating system that can also be used for keeping the windscreen clear when the machine is flying in ice-forming conditions. It is fitted with two Rolls-Royce "Merlin" engines, which drive 4-bladed propellers, and its speed is given as 385 m.p.h. The range is about 1,500 miles.

Another new British single-seat fighter is the de Havilland "Vampire," now under construction. This is a jet-propelled machine, and its gas turbine engine will give it a speed of over 500 m.p.h. The third new British single-seat fighter is the Vickers "Spiteful," developed from the famous "Spitfire" and fitted with a Rolls-Royce "Griffon" engine. It is reported to have a top speed of over 460 m.p.h.

Miles "Aerovan"

Yet another new Miles aircraft is the little "Aerovan" transport, which has a wing span of only 50 ft. but can carry a payload of one ton a distance of 560 miles. In many respects it resembles the larger Fairchild "Packet" transport described and illustrated in the "*M.M.*" of June last, and is powered by either two "Gypsy Major" or two "Cirrus Major" engines of 140–150 h.p. each. It is shown in the lower illustration on this page.

The "Aerovan," which was originally designed as a light military freighter, is one of the most versatile aeroplanes ever built, and can now be supplied as a civil freighter, 6–10 passenger transport, ambulance, mobile operating theatre, flying caravan, or as an aerial shop equipped with showcases. Indeed its applications appear almost endless, and the fact that it can be operated for a fuel-oil cost of about 3½d. a mile opens up new possibilities for the private-owner. J.W.R.T.

Long Flight by "Skymaster" Transport

A notable long-distance flight was made recently by a Douglas "Skymaster" of the R.A.F. Transport Command. It flew from this country to Karachi and back, 9,120 miles, in a total flying time of only 42 hrs. 23 min. On both trips it refuelled at Cairo, and there was a stay of 8 hrs. at Karachi before beginning the return flight. On the outward trip the machine carried 8,000 lb. of military freight, and on the return flight 1,755 lb. of freight and 27 Service men.

* * * *

On the 21st June last Jersey and Guernsey Airways Ltd. resumed the operation of a regular air service between London, Guernsey and Jersey. Two trips in each direction are made daily, including Sundays.

* * * *

New British aircraft officially mentioned are the Miles "Monitor" I target-towing monoplane, which has two Wright "Cyclone" engines, and the Avro "Lincoln" 4-engined heavy bomber developed from the "Lancaster." This new machine will also be produced in Canada and Australia.

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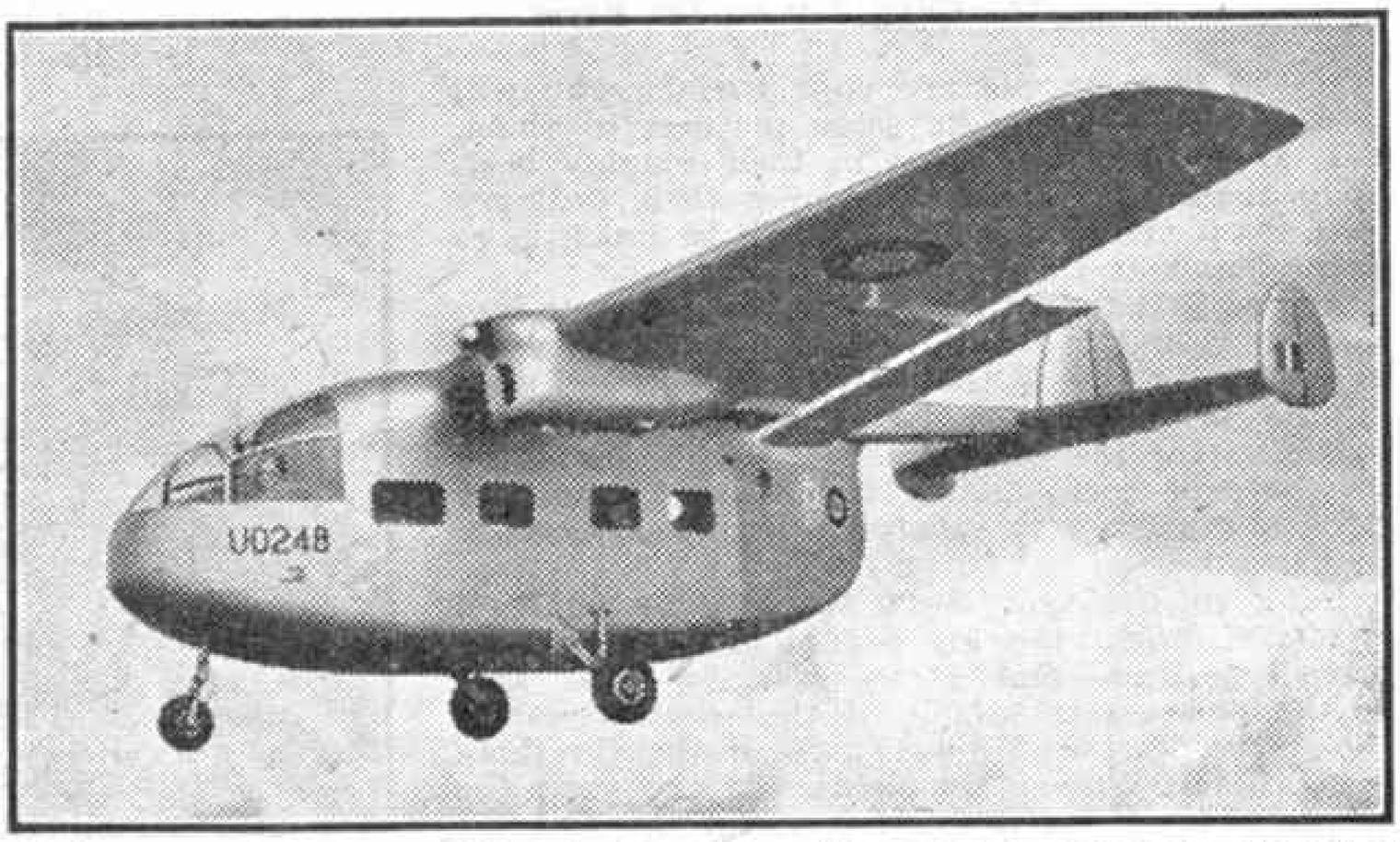
A daily air service is now in operation between Rangoon, capital of Burma, and Calcutta. The flight takes about 5 hrs. and both passengers and freight are carried.



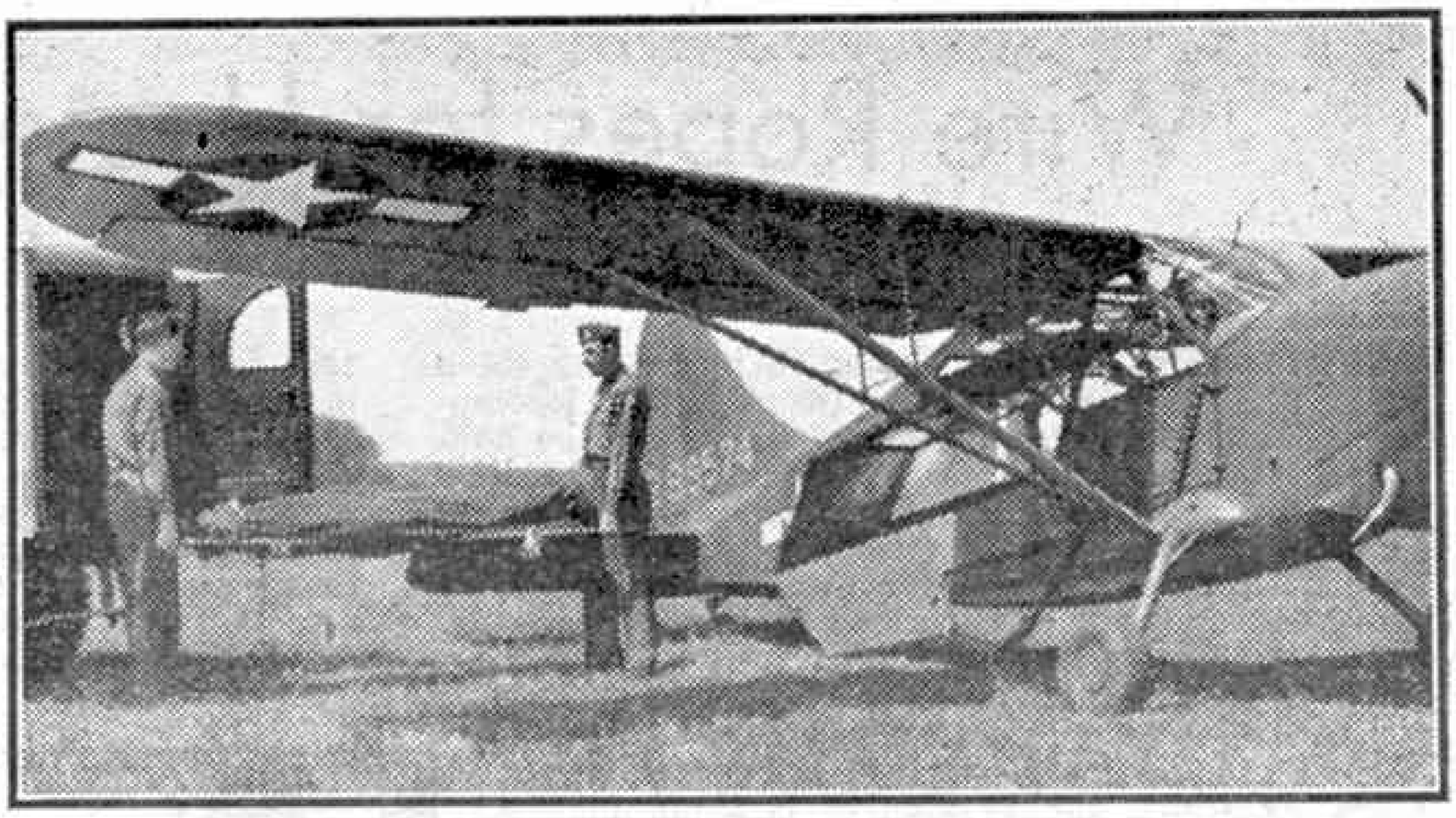
This unusual little machine is the Miles "Aerovan" transport, described on this page.

"Flying Jeeps" in Burma

Several types of American light aircraft are now being used as ambulance planes in Burma and the Pacific war zones. Their ability to land and take off from small, rough airstrips makes them ideally suited for the task, as, provided a clearing can be found in the jungle, these "Flying Jeeps" can evacuate casualties from even forward areas.

One of these aircraft, the Stinson L5-B, a development of the L-5 "Sentinel," is shown in the top iilustration on this page. The fuselage has been modified so that a considerable portion of one side can be hinged down to permit loading of a stretcher. Before the advent of these tiny ambulance planes, critically wounded men often had to be taken to rear areas by human litter bearers and mules. In some cases this method required 24 hours to travel ten miles; now the same distance is covered in a matter of minutes. This is particularly important in stomach wound cases, as men treated within four hours are generally saved, but after that every minute lessens their chance of recovery.

J.W.R.T.



The Stinson L5-B Ambulance aircraft, a type that is giving good service in Burma and the Pacific war zone. Photograph by courtesy of Consolidated-Vultee Aircraft Corporation, Stinson Division, U.S.A.

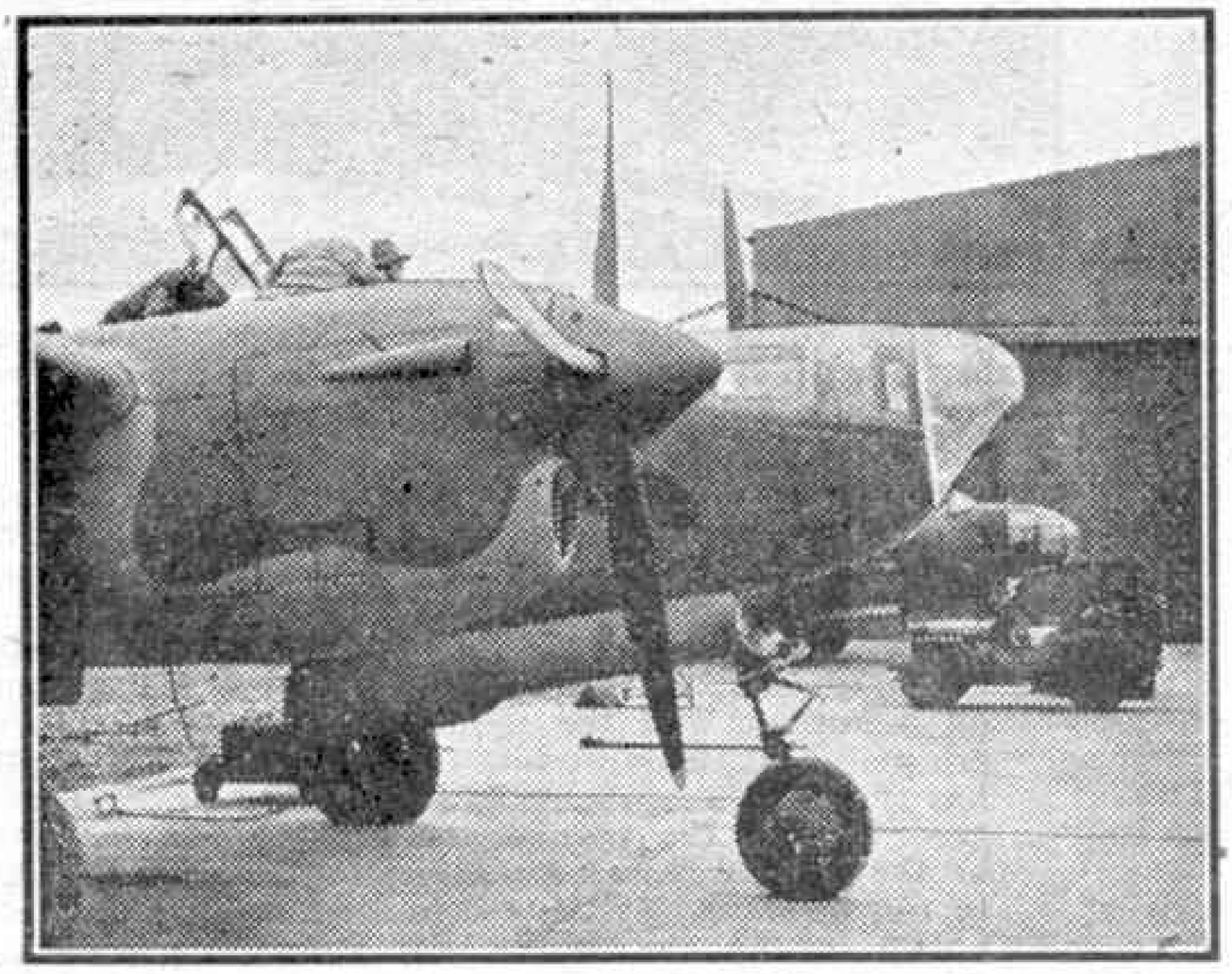
The "'Droop-Snoot' Lightning"

Sofne time ago two American colonels serving with the U.S. 8th A.A.F. Fighter Command in Britain—C. S. Hough and D. S. Ostrander—worked out a scheme for converting the Lockheed P.38 "Lightning" into a two-seat, high-altitude precision bomber. Their idea was supported by General Eaker; and Lockheeds were asked to build a prototype. After three months of intensive flight-testing it was agreed that the "Lightning" so adapted, which was nicknamed "Droop-snoot," could bomb accurately at speeds at least 50 per cent. greater than that of the "Fortress" or "Liberator." As the "Lightning" can carry a maximum bomb load of up to 4,000 lb. for short distances this made the new version a most useful addition to the 8th Air Force's offensive equipment, and several of these machines have been in service for over a year.

In general appearance the "Lightning" remains unaltered, but a bomb-aimer's window and two Plexiglass side-panels have been added in the nose (see bottom illustration on this page). In place of the normal armament, a prone position for the bomb-aimer, Norden bombsight, instruments, oxygen and heating equipment, armour plate and other apparatus are installed. The new nose is easily interchangeable with the standard fighter nose.

The "Droop-snoot" is usually employed to lead a formation of standard "Lightnings," all carrying full bomb loads, in attacks on heavily defended targets. Their first attack was on the air field at Caen in May last year, and later they made many equally successful raids in support of the Allied Armies of Liberation.

J.W.R.T.



Profile of a "'Droop-Snoot' Lightning," showing the transparent nose with bomb-aimer's window. Photograph by courtesy of Lockheed Aircraft Corporation U.S.A.

Over 2,200 "Superfortresses" Produced

On the 15th June last, the anniversary of the first Boeing B-29 "Superfortress" raid on the Japanese homeland, the Boeing Aircraft Company announced that 2,075 "Superfortresses" had been produced at the Seattle-Renton and Wichita, Kansas, factories; plus the equivalent of 149 additional B-29s in spare parts, making a total of 2,224 aircraft or equivalent parts. Parked wing-tip to wing-tip, the 2,224 B-29s would stretch for more than 59 miles. More than half of the "Superfortresses" were built at the Boeing plant in Wichita, the first to begin quantity production of the big bomber.

During the first five months of their operation against Japan the "Superfortresses" were flown from bases in the China-Burma-India theatre and were attached to U.S. 20th Bomber Command. On 24th November last year "Superfortresses" of U.S. 21st Bomber Command based on the Marianas Islands joined in the air war on the Japanese mainland. Recently the U.S. War Department revealed that the B-29 group originally based in the China-Burma-India theatre has been transferred to the Marianas.

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Plans for a big international airport at Faro, on the south coast of Portugal, have been approved by the Portuguese Director of Civil Aviation.

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The Swedish Government have bought 50 North American P-51 "Mustang" fighter aircraft from the United States.

Wire Ropes for Heavy Loads

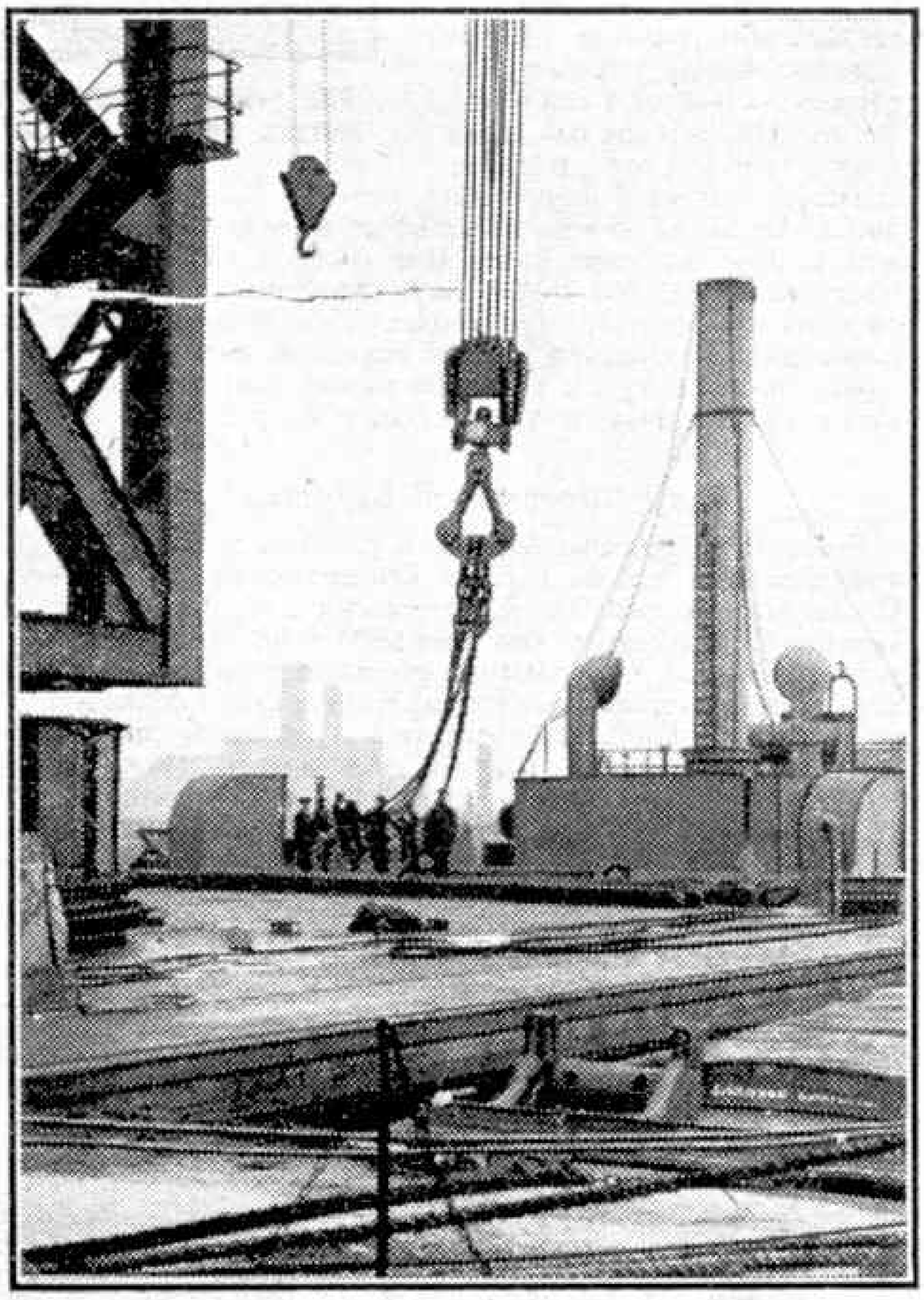
How Safety is Secured

OUR cover this month shows an interesting scene at the Liverpool Docks, with an electric locomotive being lowered by a gigantic crane into the hold of the vessel in which it was transported to New Zealand. The locomotive itself is one of a series built by the English Electric Company for use on lines of the New Zealand railways that had been electrified and will be described later in this article. It weighs 88 tons and its total length is 46 ft. 2 in. Loading such a massive piece of machinery into the hold of a ship requires the greatest care and adequate equipment, and in the operation the ropes by which the locomotive is slung play a most important part. These must be absolutely reliable in every way, capable of supporting with a good margin of safety the loads for which they are designed, and the slings made from them must be properly designed on sound engineering principles.

For work of this kind wire ropes are now generally employed, and those seen on our cover were made by British Ropes Ltd. To a large extent wire ropes now have superseded metal rods, fibre ropes and chains. They have the advantage that weight for weight they are stronger than any of these, while they can be very flexible and are easily protected from deterioration, so that they are generally more convenient and more economic in use than other forms of rope. They can now be supplied for almost any purpose, from "flying fairies in a pantomime" to raising sunken battleships, for their strengths range from 3 cwt. to 650 tons. A list of the many uses to which they can be put would be a very long one indeed. To mention only a few, they are employed for hoisting and lowering the cages of coal mines and for hauling trucks in the mine itself; on lifts, cranes and oil well drills; and in excavators, bulldozers and many other power-operated machines. Their use in war service has been universal. They were employed in Mulberry Harbour and in the Pluto scheme for transmitting oil by pipe line across the Channel into the heart of Europe, and they have given good service in radiolocation, on rockets and parachutes, and in mine sweeping, in addition to their use for countless purposes in ships and aeroplanes.

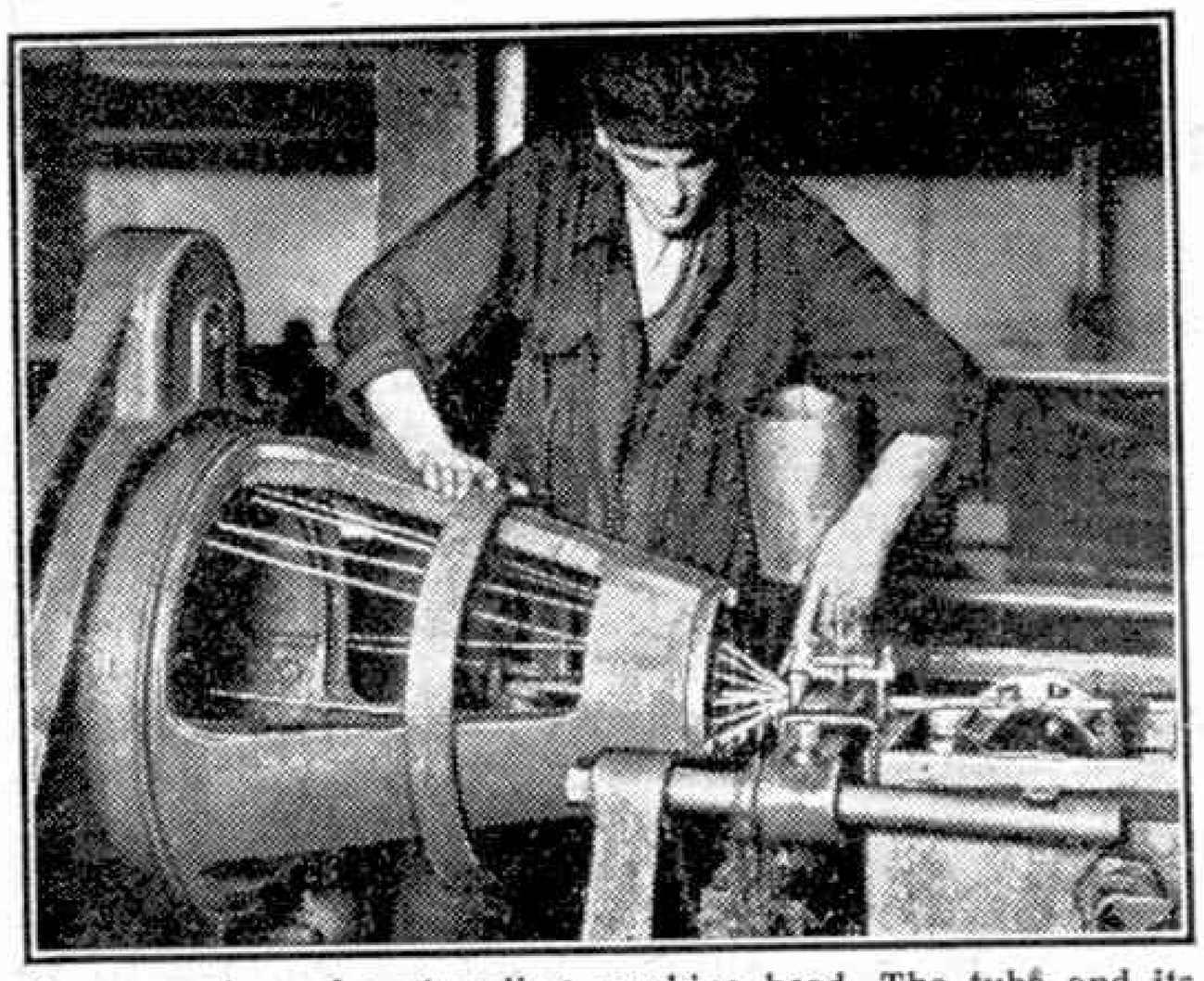
A modern wire rope is a very interesting product in itself, as is shown by the following account of its manufacture, for which we are indebted to British Ropes Ltd. It is made from wire, which is a solid section of metal drawn out to the required diameter. A number of wires twisted together form a strand, and a rope is produced when the strands themselves are combined in the same way. The production of wire rope begins in the steel foundry, where selected steels of suitable composition and quality are cast into ingots 4 ft. in length and 2 ft. by 2 ft. in cross section. After cooling these are heated for rolling. The ingots pass through a series of rollers, which reduce their cross section to about 4 in. by 4 in., a process in which they are greatly lengthened to form a bar, which is cut into billets about 20 ft. in length. Further heating and rolling reduces the billets to rods about $\frac{5}{16}$ in. to $\frac{1}{2}$ in. in diameter, which are coiled and transferred to the wire mills.

The making of wire from the rods is called drawing, and is carried out by pulling a wire of a certain diameter through a hole slightly less in size. This is repeated until the desired diameter or gauge is reached. The wire is not heated for this process, but at intervals during the drawing it is heated, cooled and specially treated in order to anneal it, that is to remove stresses set up in it and to make it more malleable for further drawing. Then follow tests to make sure that the wire has the required strength and that it can be bent and coiled as required. These tests are very severe. For instance, in order to make sure that the wire has the required tensile strength, or resistance to pull along its length, a section of it is pulled until it breaks and the force required to do this is measured. Generally for wire rope the tensile strengths range from 80 to 120 tons per sq. in., but some ropes are made with wire of as low as 25 tons per sq. in. and others as high as 150 tons per sq. in.



Wire rope slings suspended from a mammoth floating crane. For the illustrations to this article we are indebted to British Ropes Ltd., Doncaster.

The wire is now ready for making into rope in the stranding shops. It reaches these in a coil wound on a bobbin, and the required number of bobbins are placed in the stranding machine, 12 if the strand has to have 12 wires, or 7, 19, 24, 37 or even more, according to the number of wires to be included in the strand required. All the wire ends are led to the front end of the machine and there they are pulled off by the drawing-off apparatus, while at the same time they are rotated so that a spiral lay or formation is given to the wires in the strand. In rope making the length of each spiral turn, or the pitch as it is called, is known as the length of lay.



Close up view of a stranding machine head. The tube and its head are rotated as the made-up strand is pulled off in order to give the required spiral arrangement.

The strands are coiled on to larger bobbins as they are made, and these in turn are mounted in a closing machine, in which the wire rope itself is built up by pulling the strands forward and rotating them, in a similar manner to the formation of a strand from its constituent wires. The strands are closed over a core, generally of fibre, which provides a bed or foundation for them.

It is interesting to examine a wire rope to see how the wires and strands are arranged. Most ropes are made right-handed ordinary lay, in which the strands in the rope are laid right-handed, like the thread of an ordinary screw, while the wires in the strands are laid in the opposite direction, so that they have a left-hand coil. The result is that the individual wires appear to run along the centre line of the wire rope, and this allows rope of ordinary lay to be recognised easily. In another form of rope that is largely used the wires in the strands and the strands in the ropes are laid in the same direction, so that the individual wires are seen slanting across the centre line of the rope. This form of wire rope is described as Lang's lay. Ropes of this lay should never be used where the load or the rope end is free to turn, and generally they are suitable only for special purposes, as are certain other forms of construction.

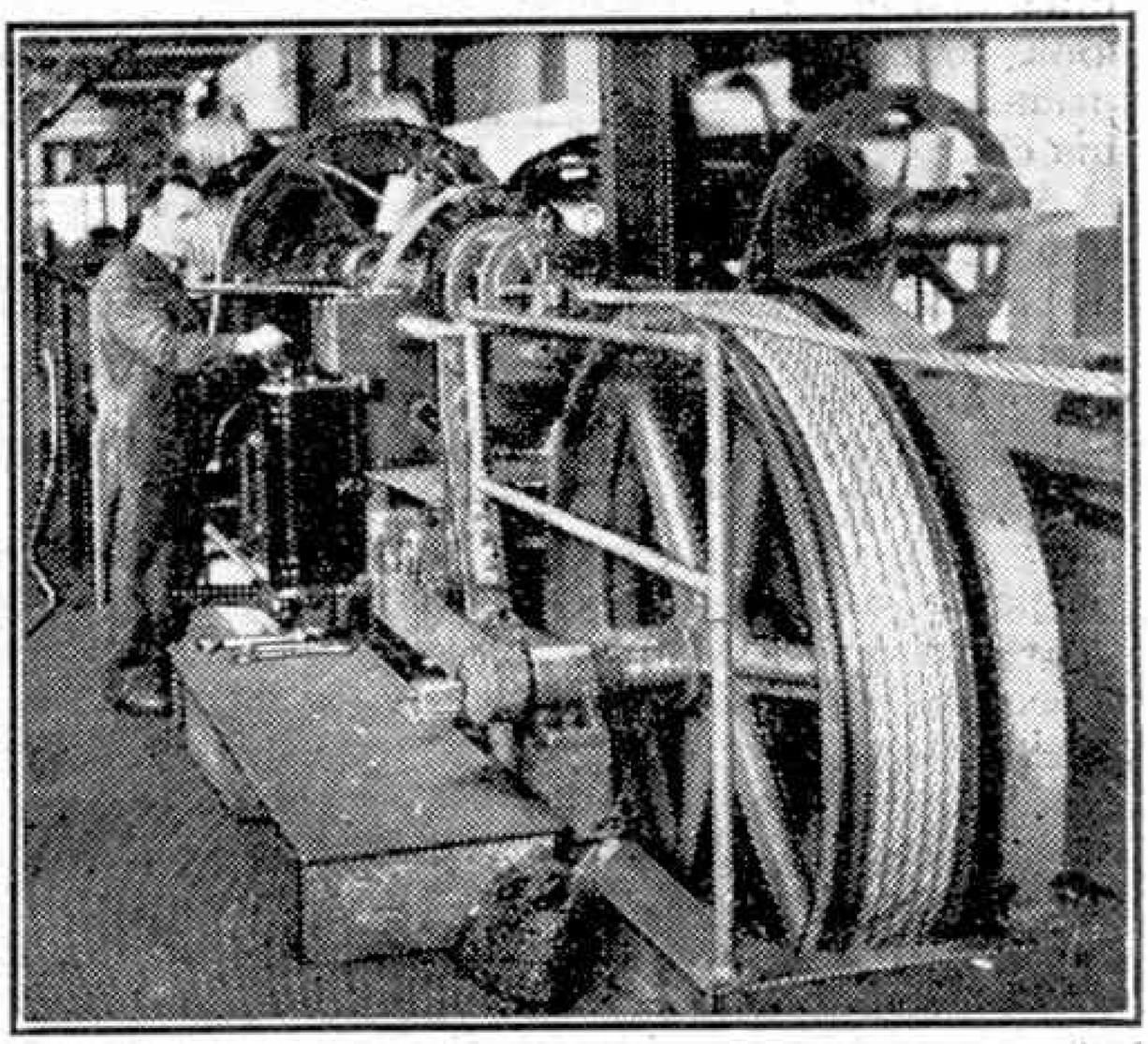
There are usually six strands in a wire rope, but for elevator work a rope of eight strands is often used, while different numbers of strands are used in various ropes made for Admiralty and other work. An interesting point is that n marine mine moorings the centre is made of wire instead of fibre. The purpose of this is to prevent stretching of the rope as much as possible.

When a wire rope has been made a portion of it is tested by pulling on it until it breaks, and every rope has a guaranteed breaking load. This is not the load to which it is subject in actual work. Usually this is only a sixth of the guaranteed breaking load, thus giving a considerable margin of safety. Even this margin is not regarded as sufficient for rope to be used on passenger lifts, where ropes with a breaking load 20 times the working load is used. At first glance it may appear extravagant to use ropes so much stronger than is required, but there are several good reasons for this. One is that the shock load when weights are suddenly lifted, or stopped while being lowered, is considerably more than the weight itself, and this has to be allowed for. Another is that the effects of deterioration due to the breaking of individual wires in the strands, by wear, corrosion and so on, are taken care of by providing a good margin of safety.

The electrification scheme for which the locomotive was designed, one of several New Zealand Railways projects of this kind, concerned the line from Wellington, the capital, northward to Auckland, some 400 miles away. This started as a single track section with 5½ miles of severe climbing, so that it was necessary to double head every train out of Wellington along the line. To avoid this a tunnel was driven through the hills that bounded Wellington on the north to give a new line with easier gradients. This has two sections, one ¾ miles in length and the other 2½ miles, and it was decided to electrify these to make travelling through the 3¼ miles of tunnel as comfortable as possible. Beyond the tunnel there was more severe climbing to be done, and the electrification was therefore extended to a distance of 24½ miles altogether.

The necessary equipment for this electrification was supplied by the English Electric Company, which forwarded one complete electric locomotive and the parts for a further seven, to be assembled in the railway workshops in New Zealand. Direct current at 1,500 V. is used, with an overhead contact wire, and the locomotives were designed to haul express passenger trains of 200 to 400 tons non-stop, and goods trains of a maximum of 500 tons, non-stop or stopping at all stations. The wheel arrangement is 2–8–4 and each locomotive has four motors, with a total rated output for 1 hr. of 1,240 h.p.

An interesting feature of the locomotives is the spring quill drive employed. The motors and transmissions are fixed to the locomotive structure, and each motor carries a quill, which is a hollow steel shaft that fits over the axle between the wheels and is supported in bearings fitted to the motor frame The quill has a solid spur gear wheel at one end, which is driven by a pinion on the armature shaft of the motor. The drive is transmitted from the quill to the road wheels by spring cup brackets, six at each end, which project between the spokes of the driving wheels and engage in either direction with hardened steel plates welded to the spokes.



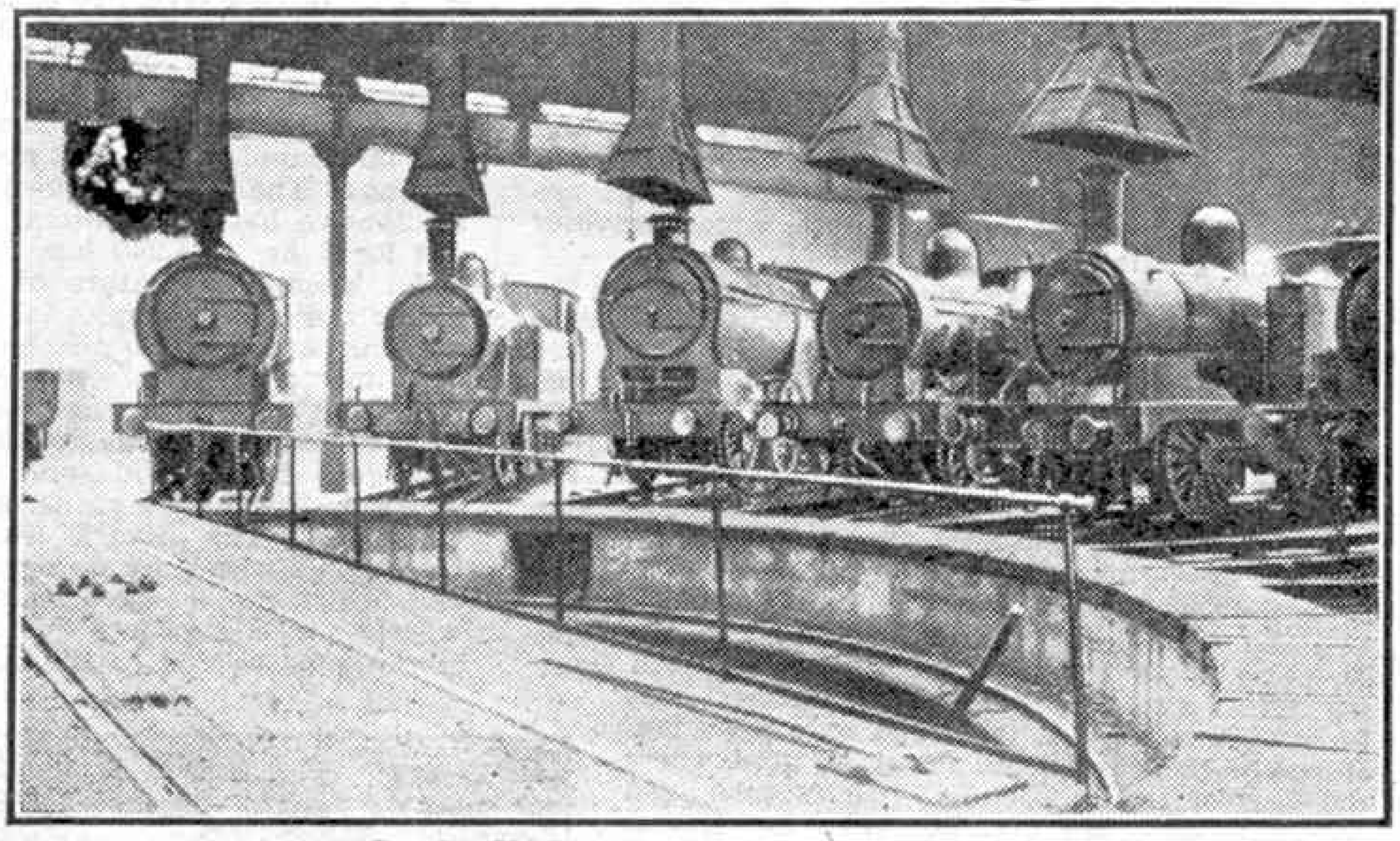
A wire rope closing machine, in which the strands are united to form the rope.

On Visiting a Locomotive Depot

By "Shed Superintendent"

DURING the War locomotive enthusiasts have had much to interest them, and there are signs that they have had an increase in their ranks. Unfortunately, admission to locomotive depots has been restricted for reasons of security. Now that the chances of seeing inside a locomotive depot are improving, a few hints on correct procedure will be useful to intending visitors.

You should first obtain a permit from the Motive Power Superintendent, or Locomotive Running Superintendent, of the railway concerned. Your local stationmaster can tell you the address if you do not know it. You should specify the depot or depots you wish to see, and the dates of your intended visits. A stamped addressed envelope will ensure a speedy reply. Without a permit, any Shed Superintendent will be quite justified in refusing you permission to look round the premises under his charge.



In the Shed. Photograph by O. S. Nock.

Assuming you have secured your permit, you should, on arriving at a Depot, find the office and report your presence to the Shed Superintendent or his deputy. This is not only an act of courtesy which is observed by railway officials among themselves, but also it will ensure that you are properly attended to, and, if possible, provided with a guide. To report to the office may sound obvious advice, but it is surprising how often visitors fail in this rule, thereby laying themselves open to rebuke and to danger as well. It is very easy to be taken unawares by a moving engine, if you are not acquainted with the engine movements in a depot; and the chief anxiety of the Superintendent is that you shall leave the premises on your own feet and not in an ambulance!

If you make it clear that you are interested in the work of the depot, you will be provided with a guide who can explain it to you. Real interest in the job is appreciated by railwaymen. But do not expect a busy official to devote his time to you if you have only come to take engine numbers, which could just as well be taken from the station platform. Of course, number-taking is not discouraged when it is coupled with genuine interest.

An hour or so is about the right length of time to keep your guide. If you have not seen all you want to see, ask to be allowed to repeat the visit some other day. If you are going to climb on engines, wear old clothes! A good tip is to wear gloves as well, otherwise the grease on your hands may be difficult to remove. But use old gloves!

Photography will soon be allowed again, and you will find that a mechanic or driver will oblige by posing for you if you ask his name and offer to send along a copy of the print afterwards.

Finally, on the question of gratuities, a few words of thanks are all that is necessary on leaving. If you make a number of applications for permits during the year on one particular railway, and wish to acknowledge the facilities extended to you in a tangible way, a small donation to a Railway Orphanage or other charity is always appreciated.

BOOKS TO READ

Here we review books of interest and of use to readers of the "M.M." With the exception of those issued by the Scientific and Children's Book Clubs, which are available only to members, and certain others that will be indicated, these should be ordered through a bookseller. We can supply copies to readers who are unable to place orders in this manner. Order from Book Department, Meccano Ltd., Binns Road, Liverpool 13, adding 6d. for postage.

"BRITISH PLEASURE STEAMERS 1920-1939"

By GEOFFREY GRIMSHAW

(Richard Tilling. 15/- net)

One of the greatest of summer pleasures in peacetime for countless "*M.M.*" readers has been a trip in one of the many finely-appointed vessels that sailed down the Clyde, to the Isle of Man, across the Bristol Channel, or in the Thames Estuary, or took passengers on excursions from the many popular seaside resorts around our coasts. There is more in such trips than the mere pleasure of the sail; readers are vastly interested in the vessels themselves, and rightly so. They learn to know the lines of the boats, to compare their speeds and to be able to tell tales of their achievements. To such readers, Mr. Grimshaw's book will be of absorbing attraction. Its appearance has been delayed by the war, which has also led to some difficulty in obtaining reliable information regarding many of the vessels concerned; but it is fascinating, well printed and arranged, with a host of splendid photographs of many of the vessels described.

Some idea of the range of this book can be gathered from the fact that all classes of pleasure ships are dealt with, from the very large cross-Channel type vessels of the Isle of Man Steam Packet Co. Ltd. to the little steamers and motor ships found round the coasts and on the Scottish lochs and Lake Windermere. Each fleet is described as it existed in the summer of 1920, with an account of the changes that have taken place since that date. The Clyde Fleet gives a splendid start, and the story of this is followed by an account of the steamers of the Western Highlands and the Irish services. Then we work our way round the coasts, dealing in turn with the fine vessels of the Mersey Ferry services, the Liverpool and North Wales and Isle of Man steamers, and so on until we reach the Humber and the North East Coast, the Forth and the Tay, by which time nearly 300 vessels have been described briefly but adequately, and accounts of their services have been given. Finally there is an interesting review of the progress that has been made during the years since 1920.

It will be seen that the book covers a great deal of ground. It makes interesting reading, and it is one that will be kept and treasured for future reference, for which the excellent index and fleet lists will be very useful.

Owing to wartime difficulties, it is impossible to guarantee prompt delivery of books ordered as described at the head of this page, but every effort will be made to ensure speedy despatch.

"NEW ZEALANDERS IN THE AIR WAR"

By ALAN W. MITCHELL (Harrap. 2/6 net)

It would need a volume of encyclopædic proportions to record adequately the achievements of the men of the Royal New Zealand Air Force and of New Zealanders in the R.A.F. in the war just ended. In this book of almost 200 pages the author has mainly confined himself to their activities while based in Britain, but the thrilling stories he tells show that in courage, daring and enthusiasm the New Zealand airmen are the equal of their gallant comrades in the other Allied Air Forces.

He recalls for us the exploits of that great air-fighter Flying Officer "Cobber" Kain, of Sgt. Pilot J. A. Ward, New Zealand's first V.C. of this war, of Group Capt. A. E. Clouston, already well known before the war for his record-breaking flights from England to Capetown and back in 1937, and of many other prominent New Zealand airmen. There is a chapter on the career of Air Marshal Sir Keith Park, whose name will always be associated with the Battle of Britain and the Battle of Malta. In addition to these stirring accounts of individual achievement, there are special chapters recording the history of the R.N.Z.A.F. Torpedo-Bomber, Spitfire, Tempest, Mosquito Bomber, and Mosquito Night-Fighter squadrons and of No. 75 (New Zealand) Lancaster Squadron.

The book is illustrated by 32 portraits and well-chosen photographs.

"MAKE A CLOCK"

(Modelcraft Ltd. 3/6 net)

This is a new Modelcraft "Planbook" containing over 50 diagrams and illustrations, with fully detailed instructions for making a remarkably simple working clock, known as a "Flip Clock." The clock is designed on an entirely new basis, and its special feature is the fact that all the materials required to construct it are ready to hand in almost every home. The chief of these is strawboard, from which the few gears, pinions and similar parts wanted are cut and toughened by the application of a special adhesive solution, the formula for which is given in the instructions. Other requirements are one or two pencils and knitting needles, a little plywood and a few odd pieces of wood, nails, tacks and screws. A drill, hammer and screwdriver are the main tools needed, with the addition of some simple jigs that the constructor can make quite easily.

Readers who like making things will find great pleasure in constructing this interesting and useful clock, and although the work calls for patient and accurate workmanship, the degree of skill required is not excessive and should be well within the capacity of older boys.

"PRINCE PRIGIO"

By ANDREW LANG (Harrap. 5/- net)

Prigio received the most magnificent presents from the fairies when he was christened, although the queen, his mother, who didn't believe in fairies, refused to invite them. They came uninvited, with such things as a purse that could never be empty, a flying carpet, a pair of seven-leagued boots and a wishing cap. But one old fairy, the last of all, just said that he should be too clever. And too clever he was, annoying everybody by knowing exactly what they ought to do and telling them at great length. He even angered the king, his father, who disinherited him. But his gifts and his knowledge enabled him to kill the two curses of his country, the Flaming Firedrake and the icy Remora, by luring them into deadly conflict with each other; and in the end we find him, still Crown Prince, still clever, but now seeming no cleverer than other people, which of course made him a popular prince and eventually a splendid king.

A great attraction of this delightful fairy story is the way in which it has been illustrated by the clever drawings of Robert Lawson.

Bombers of the Red Air Force

By John W. R. Taylor

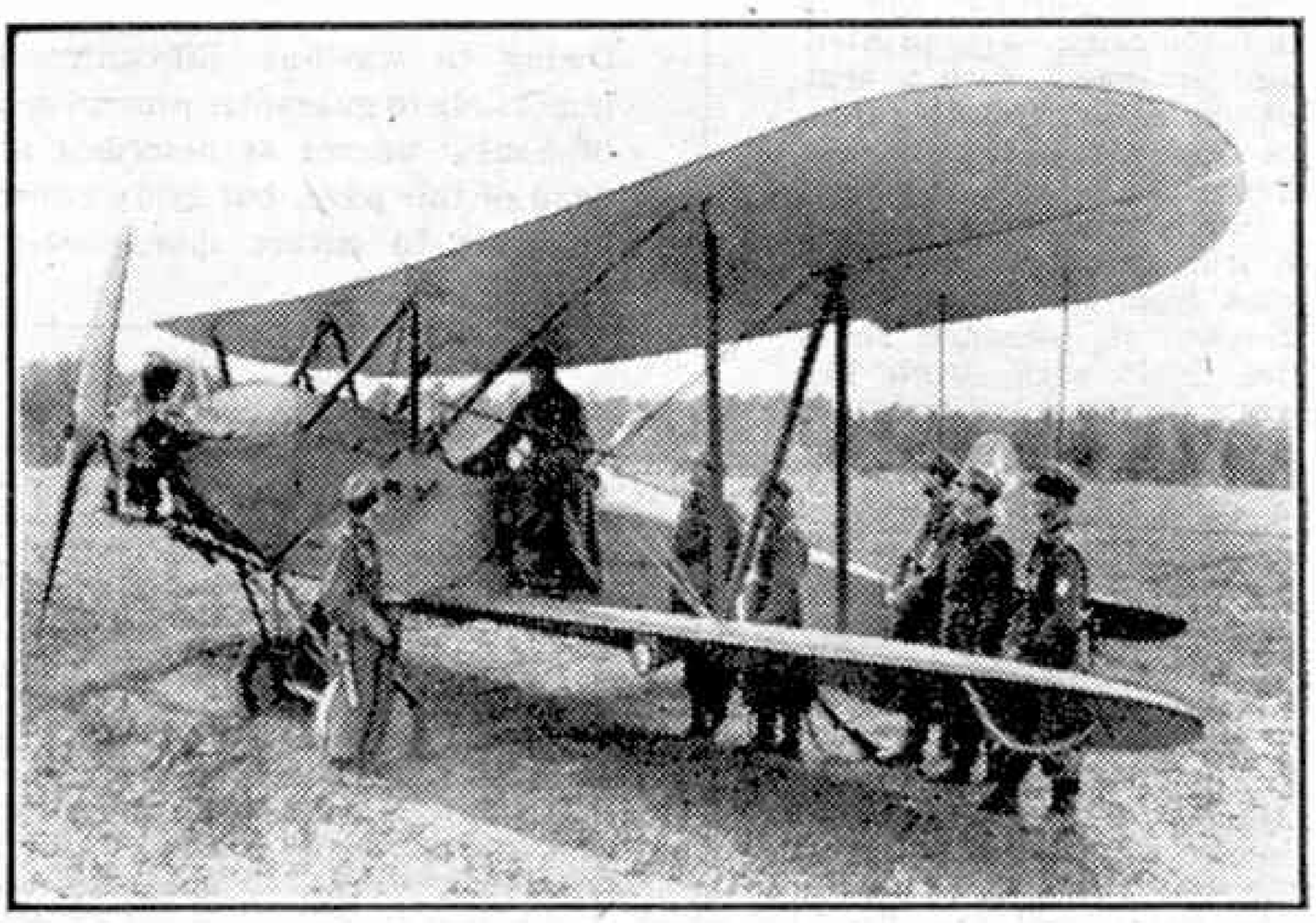
IT was very cold inside the city of Stalingrad in September 1942, but the soldiers of Hitler's Wehrmacht were confident and as contented as anybody could be crouched in a damp slit trench on a dark night. The Red Army had been cleared from all but a small part of the city. Beyond Stalingrad was the Volga, and, beyond that, the whole of Russia lay open to the invincible German Army. It could be only a matter of time before the whole of the country would be overrun.

Suddenly the night sky was filled with a noise like the popping of hundreds of motor-cycle engines, and bombs ranging from hand grenades to 200 lb. fragmentation bombs rained down on the Hun infantry. The Wehrmacht was receiving its first taste of the U-2 "Mosquito-bomber." Soon it learned to respect this decrepit-looking biplane, with its square-cut slab-sided fuselage and fixed undercarriage, and which seemed to be held together by lots of struts and wires; for the U-2 harried the broken and retreating enemy all the way from Stalingrad to Germany itself. Pilots of the U-2 are convinced that it is made by very small schoolboys in their spare moments, but they have such confidence in the little biplane with its 75 h.p. motor that they fly in all weathers from ridiculously-small fields—conditions that ground all other aircraft.

But the U-2 is only a small cog in the mighty offensive machine of the Red Air Force Bomber Command. At the other end of the scale there is the 22-ton TB-7 four-motor bomber. This aircraft is an extremely well-designed and efficient monoplane, with a wing span of 131 ft. 3 in., capable of carrying four tons of bombs, and quite comparable with other Allied four-motor bombers. It is of fairly conventional layout, the most interesting feature being the way in which each inboard engine nacelle contains not only the engine and main undercarriage units, but also its own radiator and one for the outboard engine and a rearward-firing gun turret. In this way the TB-7 presents a remarkably small frontal area and, in spite of the fact that its four M-105 engines develop only 1,100 h.p. each, it has a top speed of 280 m.p.h. and a range of 2,500 miles. The TB-7 is in service in considerable numbers and many German industrial targets have felt the weight of its attack.

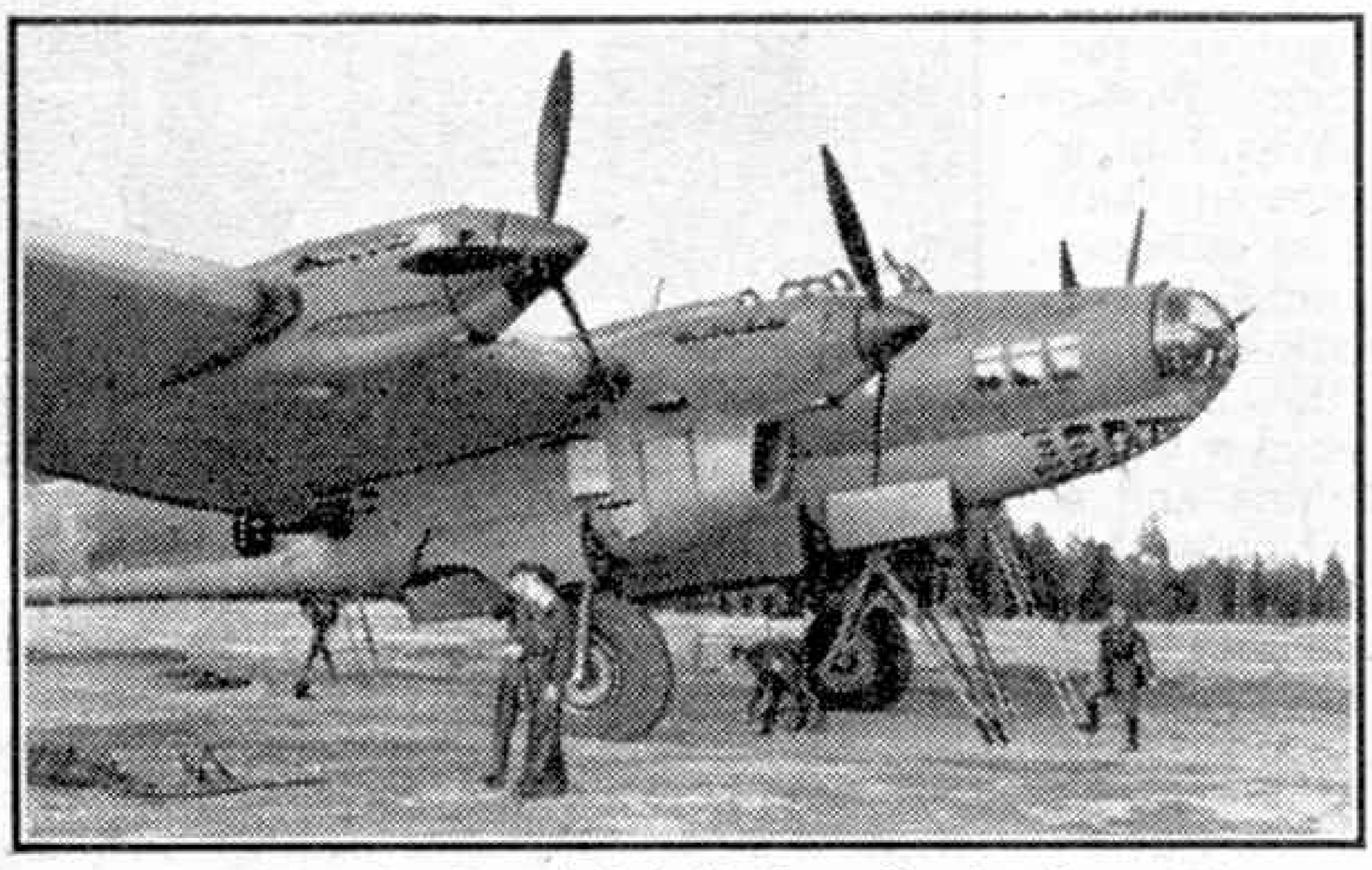
But the credit for the first Russian attack on Berlin must go to the sturdy DB-3F twin-engined medium bomber, designed by Sergei Iliuchin. In 1936 an early civil version of this type set up several altitude records, reaching 43,234 ft. with a pay-load of 1,000 lb. The DB-3 bomber was first used in the Finnish war and is comparable in size with the British "Whitley." The latest Mark has two 950 h.p. 14-cylinder M-87B radial engines, which give it a maximum speed of 260 m.p.h. with up to 5,500 lb. of bombs over a short range. It is armed with three machine-guns, in the nose and in dorsal and ventral turrets. The DB-3F has also been adapted as a torpedo-bomber, equipped for carrying an 18 in. torpedo, and achieved many successes against German shipping in the Baltic Sea. An interesting point is that the torpedoes are sometimes dropped by parachute—a new technique evolved by the Russians.

On the whole, however, the Red Air Force Bomber Command is not intended for long-range strategical bombing. Its



A Russian U-2 "Mosquito-bomber" that made a forced landing behind the German lines.

primary role is to provide the Red Army with the close air support so vital to present-day land operations. For these low-level attack duties three remarkable little bombers have been produced—the PE-2, YAK-4 and IL-2. The twin-engined



TB-7 heavy bomber of Red Air Force Bomber Command.

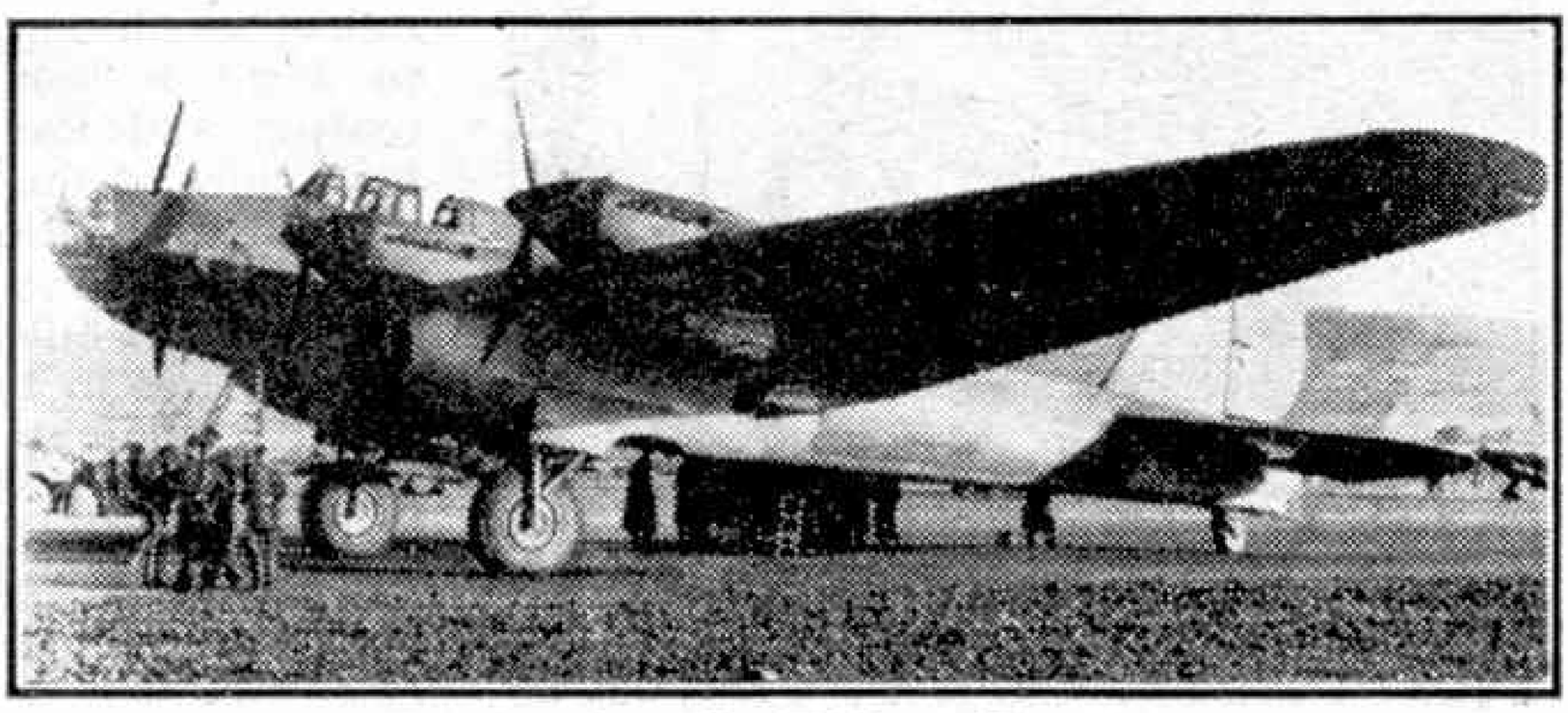
PE-2 and YAK-4 are very similar in most respects and, like the German Messerschmitt 110, appear to owe many of their design features to the attractive little French Potez 63 reconnaissance-bomber. The YAK-4 is slightly smaller than the PE-2 and carries a crew of only two against the latter's crew of three or four, but it is powered by the same 1,100 h.p. 12-cylinder, in-line M-105 engines and has similar performance figures.

The PE-2 was designed by M. Petliakoff and is aerodynamically and structurally very good indeed. A number of its features show very advanced ideas; in particular the electrically-operated trim tabs on the control surfaces, the hydraulic fuel pumps and the nitrogen-protected fuel tanks are all unusual and represent advances over common practice. The nitrogen is carried in two cylinders between the main wing spars in the top of each engine nacelle, and is connected to an air space in each tank, making the latter virtually fire-proof. The tanks are also covered with vulcanised sponge rubber "self-sealing" material.

The PE-2 is probably as clean aerodynamically as any conventional aircraft in this class can be, and bears comparison with our own "Mosquito," of which it must have been a contemporary design. The fuselage is constructed on orthodox lines, being a light metal monocoque with closely-spaced frames and stringers. It is made in three sections which bolt together. The 56 ft. 1 in. span wing is also of all-metal construction with two spars, and the metal-framed control surfaces are fabric-covered. The engines are carried well forward of the wing on simple built-up tubular structures.

Armament varies considerably, but normally consists of two fixed .50 in. Beresin machine-guns in the nose, one free .30 in. Shkas machine-gun at the rear of the cockpit and a similar gun under the fuselage. The under-gun is carried in a tubular cradle and is controlled by means of handlebars, one of which houses the firing button. It is sighted through a periscope and when not required for action can be retracted into the fuselage, the floor being closed by a sliding hatch. Provision is made for a maximum bomb load of 2,200 lb. mostly slung externally, but usually only 1,320 lb. of bombs are carried. With this load the PE-2 has a speed of 310 m.p.h.

"The Flying Death"—that is the name given by soldiers of the Wehrmacht to the IL-2 low-attack and dive-bomber. Designed, like the DB-3F, by Iliuchin, it is a single-seat, low wing monoplane powered by a 1,300 h.p. Am-38 12-cylinder in-line engine. It is probably better known in this country as the (*Continued on page 286*)



Another view of a TB-7 machine.

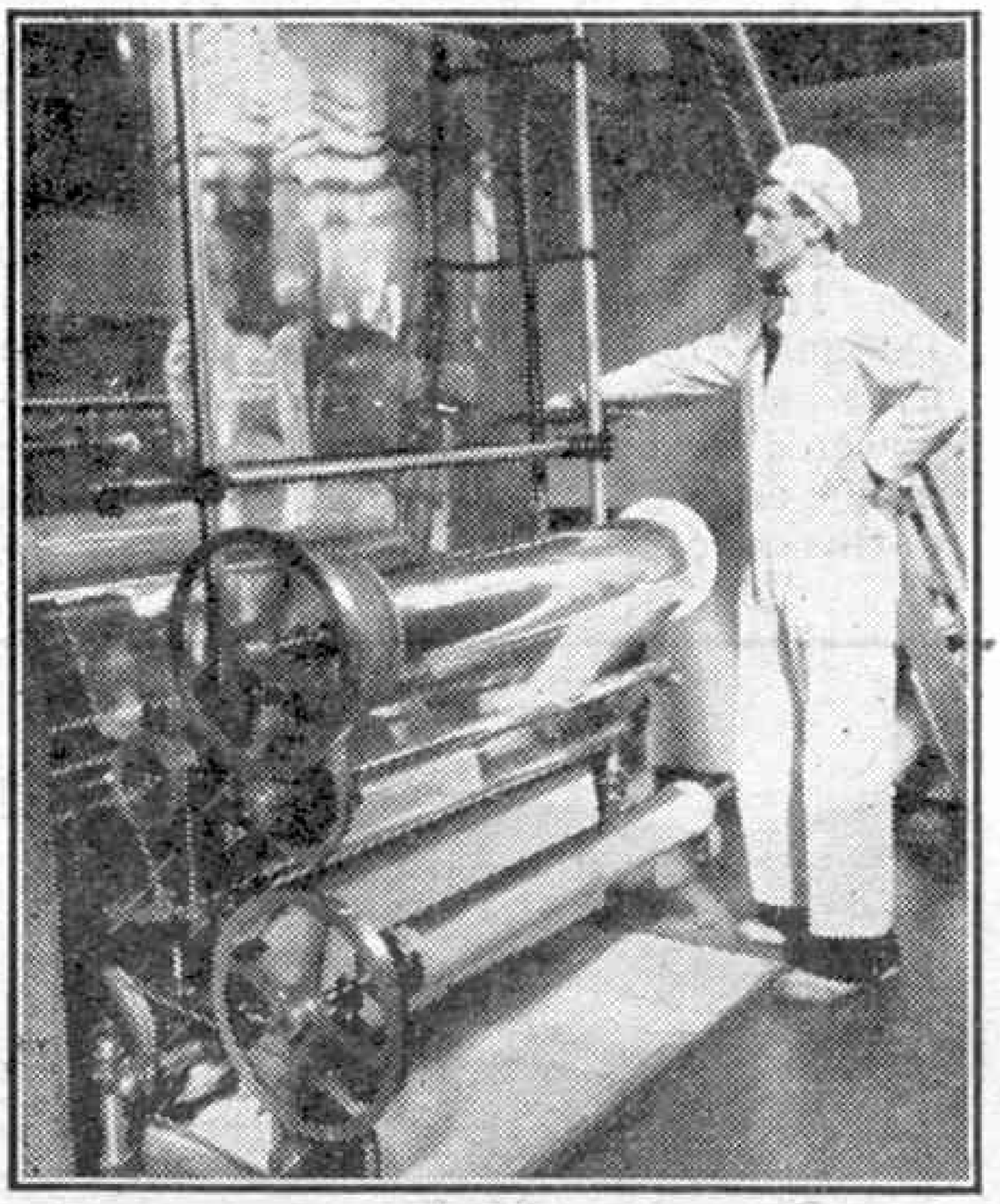
HOW THINGS ARE MADE:

Ilford Selo Films

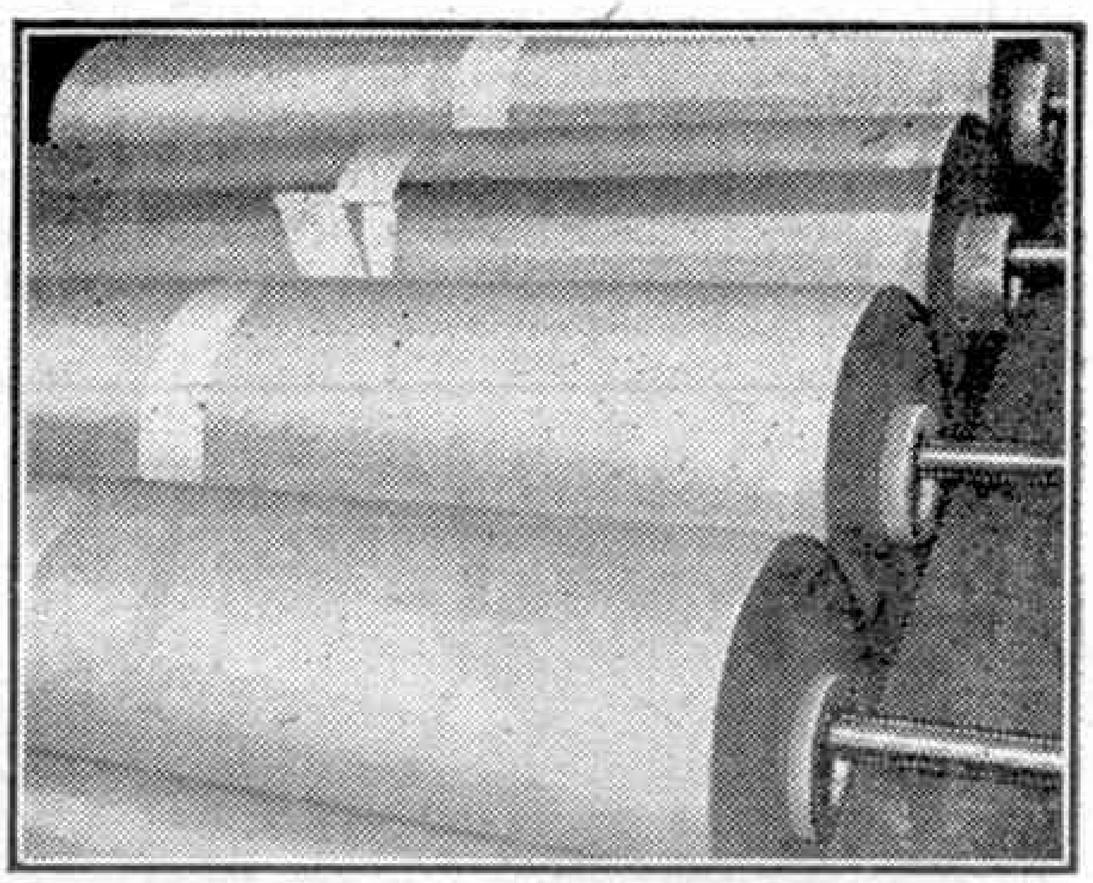
"CAN I have your matches or cigarette lighter, Sir?" This request by the gatekeeper at the Ilford Selo Works brought me up with a jerk. Was I in a danger zone? Then I remembered that photographic films are coated on celluloid and celluloid is highly inflammable, so anything likely to cause a spark or flame is rigorously excluded from the factory. I handed over my lighter, donned a white coat reaching down to my ankles, and a hat, something like a chef's, which pulled down to the back of my skull, completely covering my hair. This, I was told, was a precautionary measure to minimise the risk of dust being carried to the coating rooms.

The great factory which I was about to enter houses a plant capable of producing in a single day many miles of film, using a considerable quantity of silver nitrate in so doing. Hundreds of men and women are employed here, many of them skilled chemists and physicists, and all of them highly experienced in their particular branch of work.

On entering the factory the first thing



"Subbing." The celluloid passes over the rollers, which deposit a chemical substance to form a bond with the gelatine solution and the celluloid.



Rolls of celluloid, having the appearance of polished silver. Photographs by courtesy of Ilford Limited.

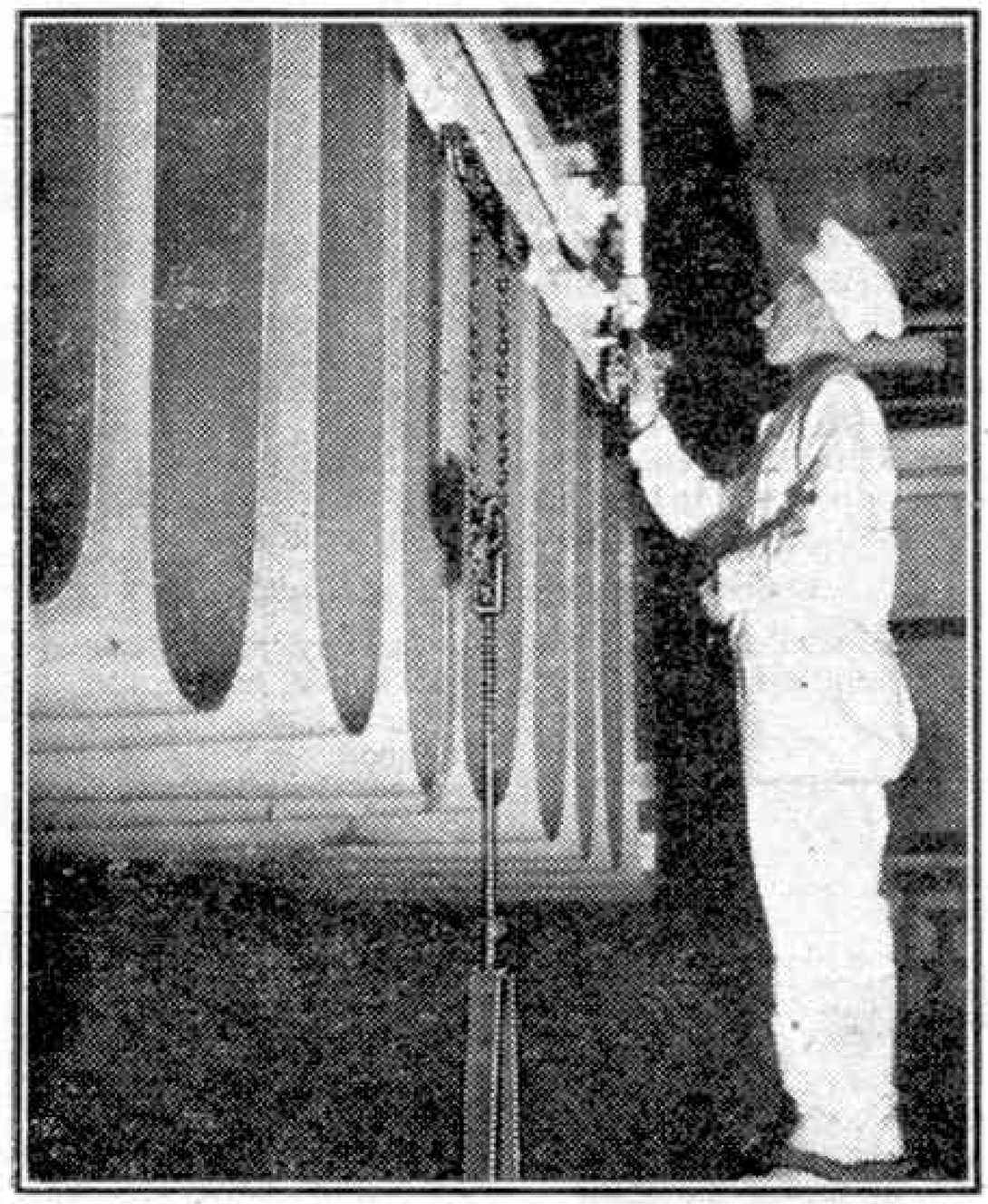
that impresses the visitor is the absence of noise and bustle. Everything seems to be planned to eliminate waste of time and effort, as indeed it is. Everywhere there is a continual war against dust and atmospheric impurities, and a standard of cleanliness exists which would make the most house-proud wife in Britain sigh with envy and despair.

I was taken first to the celluloid store, where I saw huge rolls of this material which generates electricity on its own account if slightly rubbed, and I quickly realised the force of the gatekeeper's request. Only a limited quantity of celluloid is permitted to be housed in one store, and in each store the walls and ceilings are fireproof, with sprinklers overhead which automatically, at a given temperature such as would be present in the case of fire, let down a deluge of water sufficient to drench everything beneath.

Seen in rolls celluloid has the appearance of polished silver; spread out it looks like flexible glass.

I went on to see the base made ready for coating with emulsion. This operation consists of running the celluloid over rollers which deposit a chemical substance to form a bond between the gelatine coating and the celluloid. Subsequently both sides of the celluloid are coated with gelatine to make it lie flat and prevent curl when it is cut up into roll film camera sizes. Meanwhile constant watch is kept to detect flaws in the celluloid so that these can be eliminated when the coated film is cut up.

The "subbing" of the base may take place some weeks before the final coating with the sensitive emulsion. In the meantime it is stored in dust-free rooms to "ripen" into the necessary condition.



"Festoons." The coated film passing slowly along the drying track.

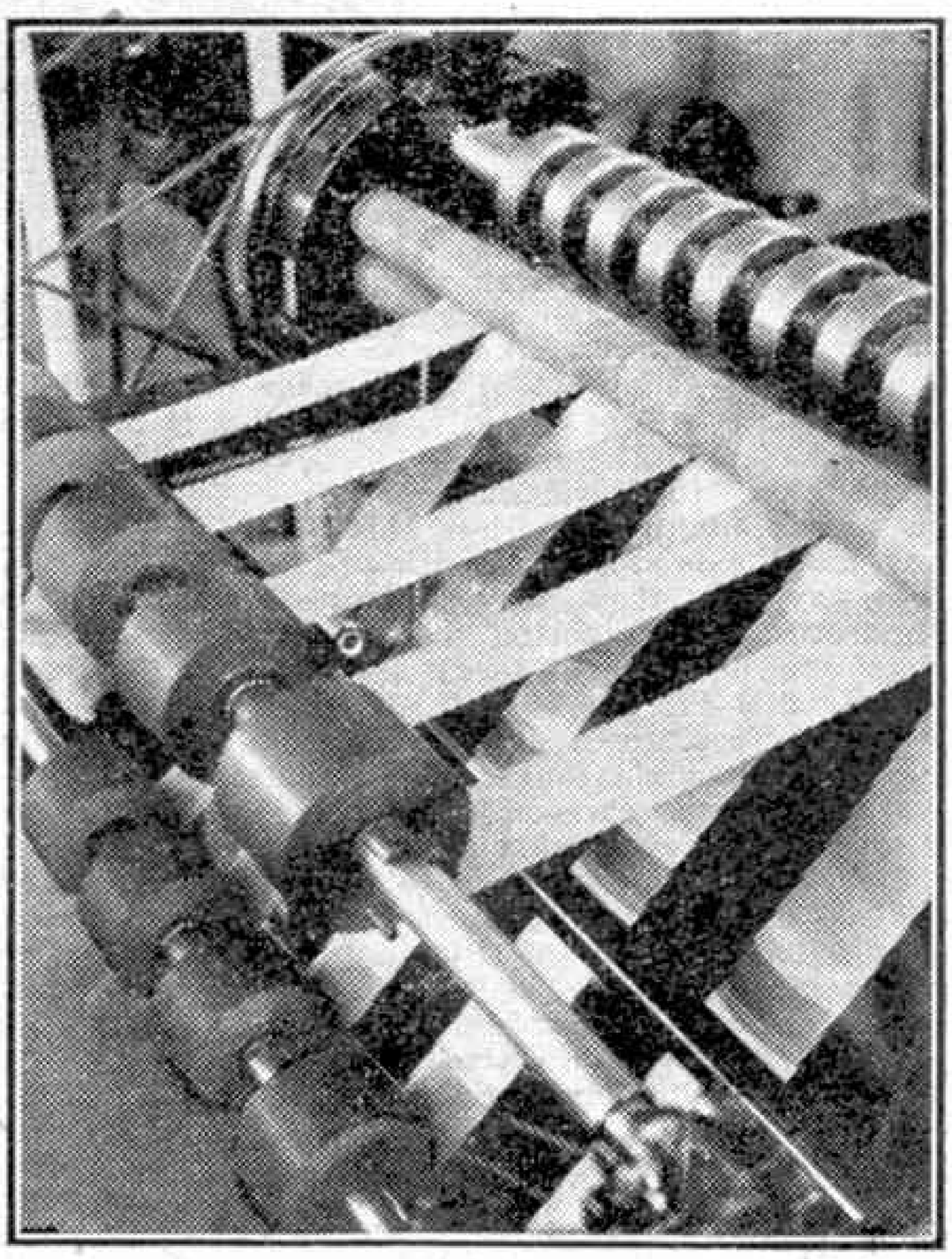
The making of photographic emulsions is done in a "safe" light and is a highly skilled process performed by trained laboratory assistants under the charge of experienced chemists. The constituents vary according to the type of emulsion, but fundamentally a photographic emulsion consists of silver nitrate added to a solution of gelatine containing an alkaline halide, which might be either bromide, chloride or iodide.

Very roughly, and very briefly, the procedure is to swell the gelatine by prolonged soaking in cold water, then to dissolve it by heating, afterwards adding the alkaline halide and silver nitrate. The proportions of the various chemicals again vary according to the degree of sensitivity and contrast of the emulsion.

The emulsification of the silver halide in gelatine is an intricate operation and must be very carefully carried out to ensure the uniform production of material of the requisite quality. The formulæ and details of manufacturing operations are never divulged, as these, of course, are rightly regarded as trade secrets.

After mixing the emulsions are "ripened" by heating in huge boilers. In many respects the emulsion-making laboratories may be likened to big cookhouses, indeed, emulsions are spoken of as being "cooked." Finally, after chilling, any soluble substances are removed by shredding in compressed air machines and washing in cold water, after which the emulsions go into cold storage to await a call from the coating rooms. When this comes an appropriate quantity is melted down to a suitable consistency for coating on to the already prepared celluloid.

The coating rooms, where the emulsions are spread on to the celluloid, are perhaps the most intriguing from the visitor's point of view. From now on until after the film is cut and spooled the journey proceeds in almost complete darkness. Entering the coating room the guide considerately takes the visitor's hand and pilots him along what seems to be a long passage. Presently a stop is made alongside a machine, and as the eyes get accustomed to the darkness a great band of celluloid is seen feeding into the machine, which distributes the emulsion carefully and uniformly on to the surface of the celluloid. The band passes on over a suction box which pulls it taut and then allows it to drop into a loose festoon. Here one expects the coated celluloid to fall to the ground, but along comes a stick moving on an endless chain, and suddenly rising it lifts up the celluloid to the full height of its arm. The slack celluloid in front falls into loops about eight feet deep and passes on. Sticks continually rise and fall and (Continued on page 286)



Slitting the coated film into camera size widths.

Railway News

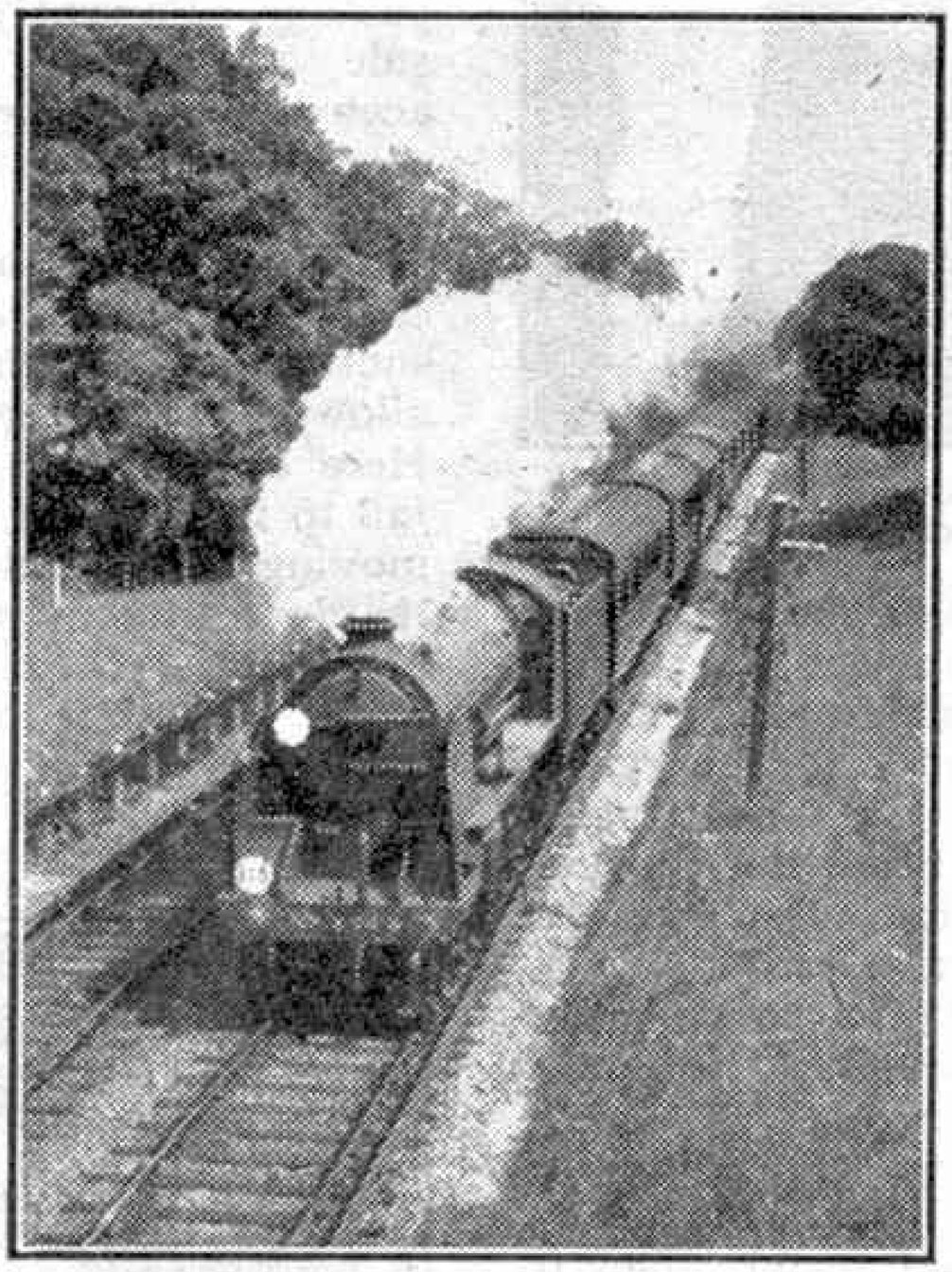
The Longest Tank Engine Run

A reference was made recently in these pages to the running during a trial period in 1909 of the "*Sunny South Express*" between Brighton and Rugby by a superheated "13" class 4–4–2 tank engine belonging to the London, Brighton and South Coast Railway. In connection with this a reader has raised the interesting question as to whether this 130-mile daily journey was a record distance for a tank locomotive on one continuous run with a fast train making few stops. To the best of our knowledge, the answer is decidedly in the affirmative. It was a most meritorious performance, as water was only taken once en route at a stop; the engine was not fitted with pick-up apparatus. The then unsuperheated "Precursor" class 4–4–0 tender locomotive No. 7 "*Titan*," working the same duty on alternate days for the London and North Western Railway picked up water at Bushey or Castlethorpe troughs on the West Coast main line, as well as at East Croydon station; she also burned more coal. The result was a Crewe decision to develop superheating and larger cylinders, though the "Precursors" were quite good engines for their day.

In the south, "13" 4–4–2Ts also used to run on their own system with fairly light trains without stopping or picking up water between Victoria or Clapham Junction and Fratton, Portsmouth, a distance of over 80 miles. So far as we are aware, this was the longest regular fast tank engine run ever rostered.

G.W.R. "County" tanks having the same wheel arrangement at one time worked through from Paddington to Swindon on a fast night train, but this 77¼-mile trip was not made non-stop nor without taking water on the way, as they were equipped with pick-up apparatus. We reported a through working some time ago between Swansea and Shrewsbury by a L.M.S. 2–6–4T, but many stops were made and assistance was given over steep gradients. Usually the longest single journeys rostered to tank locomotives do not exceed 50–60 miles, and in recent years they have tended to become less.

Over 35 years ago, the "13" engines inaugurated the remarkable era of express tank performance that culminated in the fine running with quite heavy trains of the 4–6–4 "Baltics" on the Sussex coast expresses between 1922 and 1932. To-day they work very largely over the Oxted routes between London, Tunbridge Wells West and Brighton.



A scene on the "Portsmouth Direct" line. The locomotive is S.R. 4-6-0 No. 344, of the "S15" Class. Photograph by C. R. L. Coles.

L.N.E.R. Locomotive Programme

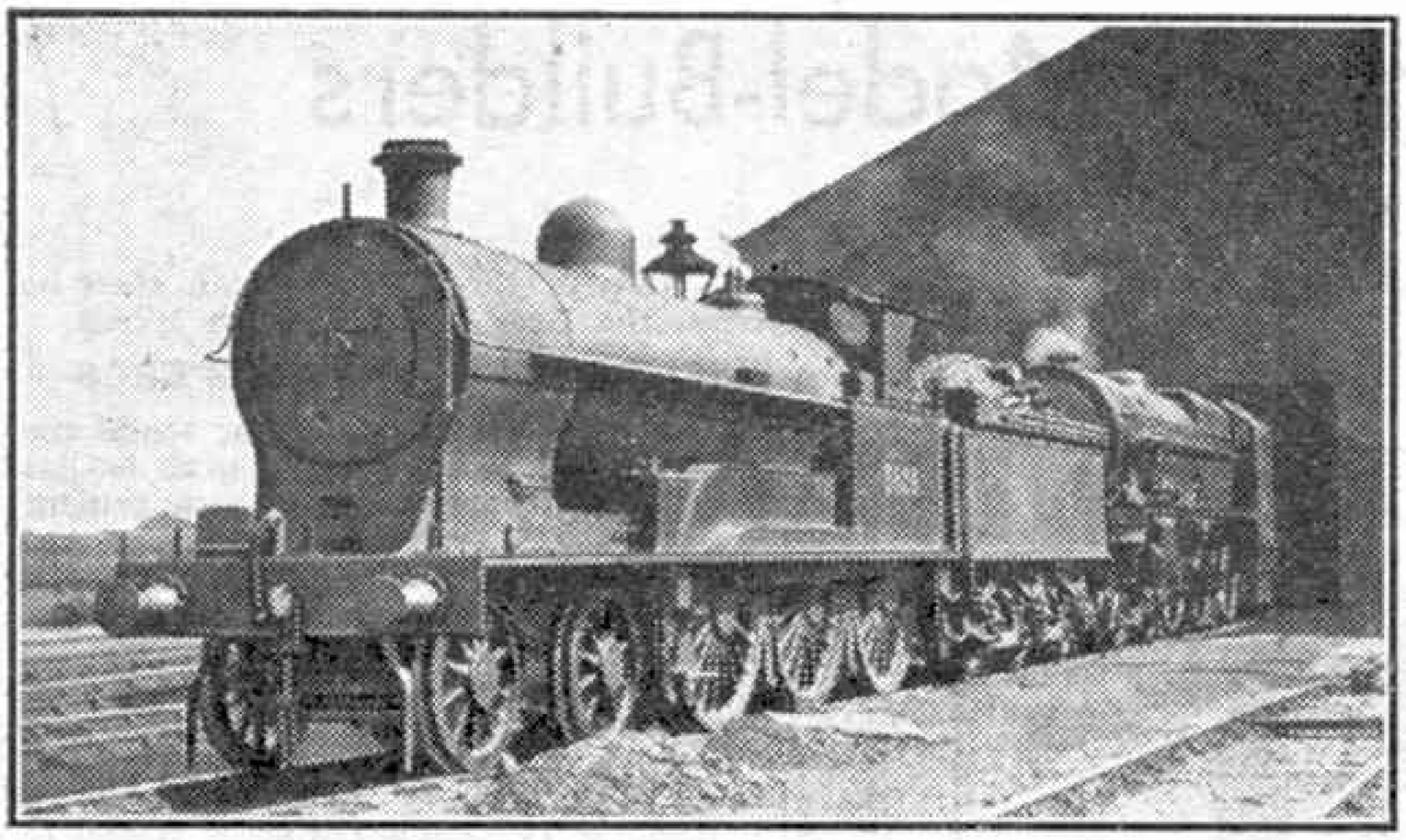
The Company announces that Mr. E. Thompson, Chief Mechanical Engineer, has drawn up a five-year plan whereby it is proposed to withdraw 1,000 obsolete engines, of 49 different classes, by the end of 1950, replacing them by a like number of modern locomotives confined to 10 different designs, of which seven are already in existence. Those to be condemned in the next five years or so will include 389 passenger tender, 126 passenger tank, 338 goods tender and 147 goods tank locomotives. In order to reduce the number of different spare parts required to be stocked, as well as to facilitate construction and renewal, all principal components are to be interchangeable between two or more of the new designs. The most numerous class to be put into service will be the "B1" mixed traffic 4–6–0s, of which there are 10 at present; it is ultimately intended to have 400. The "L1" 2–6–4 tank type now in production for heavy mixed traffic is also proposed for multiplication in considerable numbers.

Centenary Celebrations at Guildford

An excellent exhibition of railway relics, ancient and modern photographs and other mementos, as well as a corporation luncheon in the town's ancient Guildhall, marked the centenary in May last of Guildford's original railway. The first trains to what is now the joint county town and embryo Cathedral city of Surrey were provided in 1845 along a branch from Woking by the London and South Western, which had begun operations some years before as the London and Southampton Railway. Local extensions to Ash and Godalming soon followed, but it was not until 1859, after squabbles with competitors and the overcoming of many engineering and other difficulties, that the "Portsmouth Direct" line was opened throughout, thus putting Guildford on a main route from London that was destined to be greatly used.

The former South Eastern Company's trains were early in the field, then after the inauguration of the former London, Brighton and South Coast branch service from Horsham, there was the interesting instance of engines and trains of all three main companies now forming the Southern Railway working into the one Guildford station; as Western, Eastern, and Central Section workings they still do this. The loop line from Waterloo via Cobham and Effingham Junction was opened in 1885 and electrified in 1925; the main "Portsmouth Direct" was turned over to electric traction for ordinary passenger service in 1937.

Like the "Hastings Direct" route of the S.R., further east, the "Portsmouth Direct" line passes through beautiful rural scenery, though presenting many curves and steep gradients. During the final steam years "Schools" class engines hauled many of the expresses, having supplanted 2–6–0s; various 4–6–0 types were also seen a good deal at busy times. The Eastern and Central Division trains are steam worked, as are goods, parcels, and frequent specials, so Guildford is one of those places where, in addition to the electric services, ancient and quite modern tender and tank locomotives of various origins mingle. For many years Drummond "M7" 0–4–4T engines did remarkably well on fast or semi-fast trains between Waterloo, Guildford and Petersfield.



A "Prince of Wales" 4-6-0 of the former L.N.W.R. Photograph by G. F. Moore.

L.M.S. Notes

Further "8F" standard 2-8-0s recently completed include Nos. 8394–6 built at Horwich, as well as more of the 84xx and 85xx series, constructed respectively by the G.W.R. and L.N.E.R. and at present working on those systems. Building of class "5" 4–6–0 mixed traffic locomotives continues, and other types will be put in hand as soon as conditions allow.

A reader informs us that there are still 19 "Prince of Wales" class 4–6–0 express engines in service, half of them having been stationed at Stafford lately. The type was introduced by the former London and North Railway in 1911–12, having 6 ft. 3 in. driving wheels and large cylinders, of 20½ in. diameter and 26 in. stroke. One of the four remaining "Precursor" 4–4–0s, rebuilt with superheater and Belpaire boiler, has been withdrawn; this is No. 25292 "*Medusa.*" Sharing her fate is No. 721, one of the class "3" ex-Midland Belpaire 4–4–0s. These engines were designed over 40 years ago and were famous for high speeds downhill when hauling expresses over the sharply graded Midland line. Like the "Precursors" they have 6 ft. 9 in. driving wheels and inside cylinders, 20½ in. diameter with 26 in. stroke.

One of the few remaining "George the Fifth" class 4–4–0s of the former L.N.W.R., No. 25321 "*Lord Loch,*" has been seen recently fitted with a standard chimney in place of the characteristic North Western fitting. Several 0–8–0s are also similarly distinguished.

Two of the latest type unstreamlined "Pacifics" have been fitted with smoke deflectors of massive proportions. They curve inwards at the top and appear to be effective, so they will probably appear on the other similar locomotives.

The company has undertaken the construction of 800 new corridor coaches, the first to be built for over five years, as the first instalment of an extensive scheme for providing better passenger facilities. Features of the vehicles now being built include the considerable use of Nigerian cherry mahogany, no pictures or advertisements, improved steam heating and a better hot water supply. Only a few weeks before "VE Day" the coachbuilders at Wolverton and Derby were busy on assault boats and other war weapons, but a quick turnover has since been made to the line's own requirements.

Southern Railway Tidings

No. 21C 101 was working trial trips with Brighton-London passenger trains, via Oxted, towards the end of June. The appearance of a "Pacific" on those subsidiary lines, which form one of the "steam oases" of Sussex and Surrey caused quite a stir. So far this 4–6–2 was unnamed; she is painted green and including an air-smoothed outer casing looks generally similar to the larger "Merchant Navy" class. Three engines of the "West Country" series have been completed and named "*Exeter,*" "*Salisbury*" and "*Plymouth*" respectively.

Dover shed is functioning normally again after long being closed as a defence measure. Fortunately it does not appear to have suffered much damage. Several "King Arthur" and "Schools" class locomotives have been allocated there, the latter including Nos. 925–6, transferred from the Western Division and named respectively "*Cheltenham*" and "*Repton.*" There is considerable Continental boat train traffic in connection with B.L.A. leave and demobilisation travel; some of the specials regularly work through to the G.W., L.M.S. and L.N.E.R. systems.

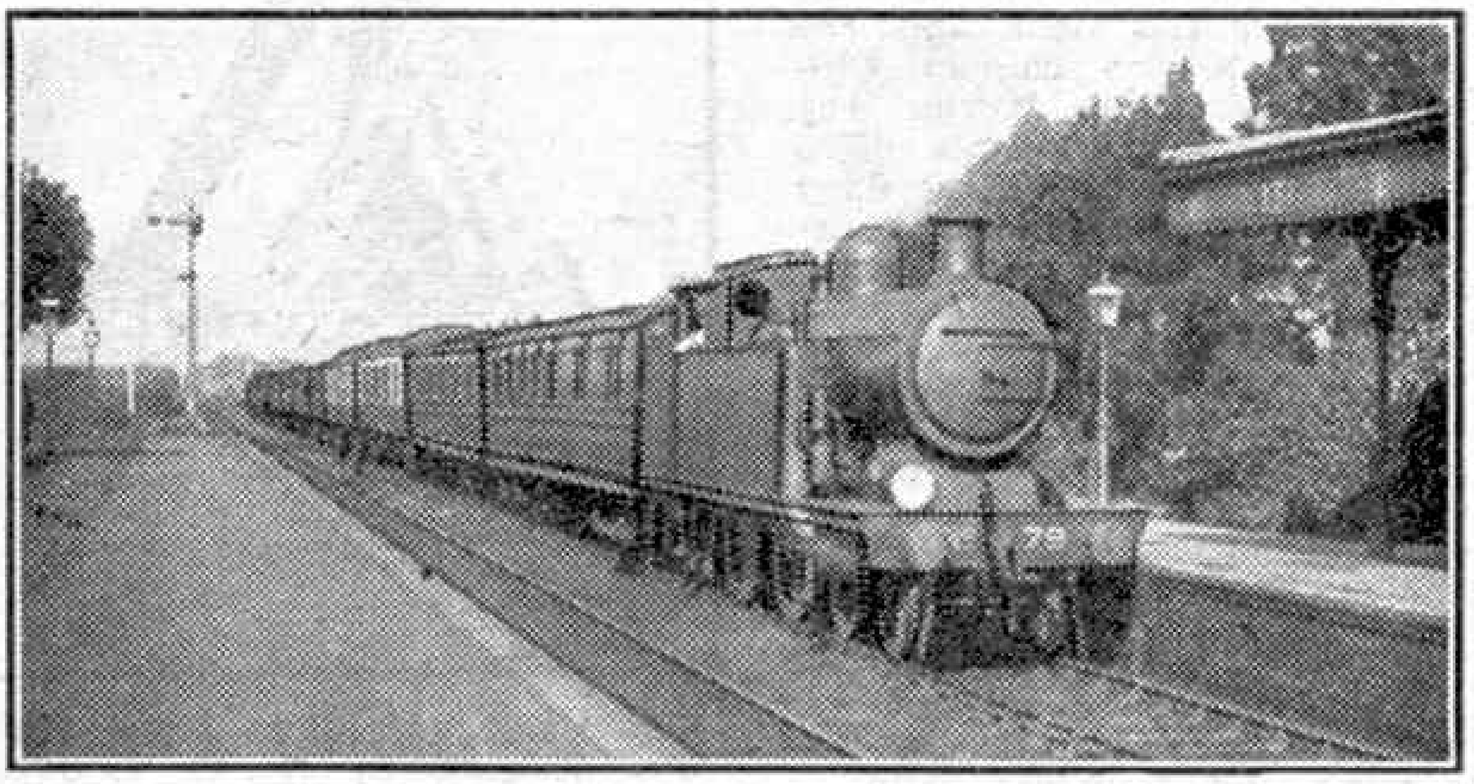
A good many of the former L.S.W. and S.E.C. 4–4–0 and 0–4–4T engines have returned from loan to the L.M.S. An observer writes of seeing CC2, the second electric locomotive, hauling a Norwood-Chichester goods.

Specials on the L.M.S.

During the European war the L.M.S. have operated no fewer than 27,043 special trains for the transport of petrol for use by the R.A.F. and the Army. This represents the movement of 2,704 million gallons of fuel. Since "VE" Day 3,221 special O.H.M.S. freight trains have been operated. These trains ran 250,000 miles, hauling 100,000 wagons.

Loudspeakers at Stations

The voice of British railways and London Transport speaks to the travelling public through 8,115 loudspeakers at 181 stations. The announcers are mainly women as it has been found that women's voices are most suited to this type of work. Each company has its own type of address. The L.N.E.R. is attempting to standardise the voices of announcers throughout the system. The L.M.S. on the other hand tend to retain the dialect of the district.



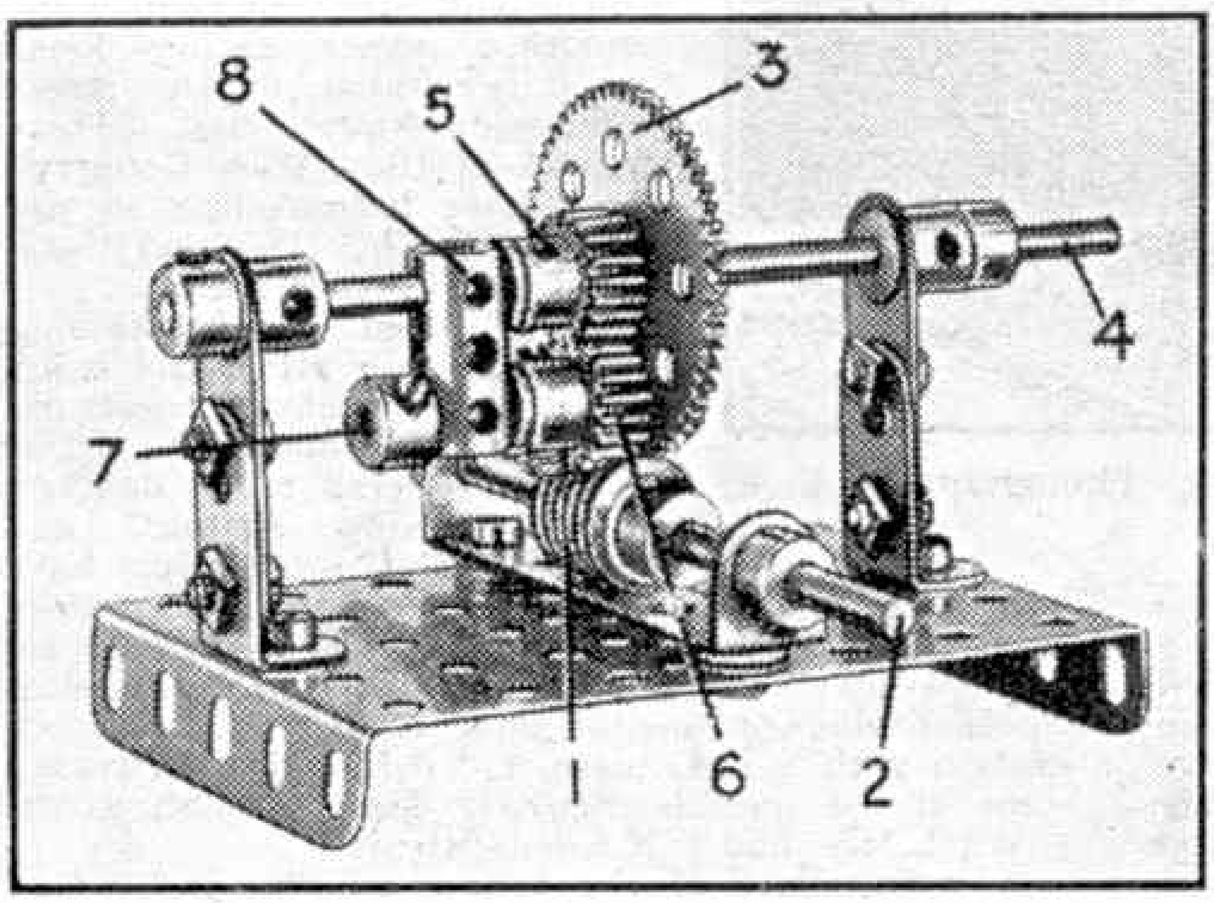
S.R. "13" Class 4-4-2T passing Hassocks with a Brighton express, including Pullman cars, in L.B.S.C. days. Photograph by H. Gordon Tidey.

Among the Model-Builders

By "Spanner"

READER'S NOVEL INTERMITTENT MOTION GEAR

Michael Corley, Hull, has been busy building a



An intermittent motion device used in a model pile-driver by M. Corley, Hull.

model pile-driver, and in the course of its construction developed a novel intermittent motion drive that may interest other Meccano users. It is illustrated on this page. A Worm 1 is mounted on a Rod 2, which in the original device was the armature shaft of an E020 Electric Motor. The Worm drives a 57-teeth Gear 3 that is free on the driven Rod 4, which carries also a fixed ½" Pinion 5. Pinion 5 contacts a second ½" Pinion 6, which is mounted on a 1½" Rod 7 held at one end in a hole of the 57-teeth Gear and at the other in a Coupling 8 mounted freely on the Rod 4 as shown. The Rod is retained in place by Collars.

When the Worm is rotated, the 57-teeth Gear is driven and carries around with it the Pinion 6. The entire unit is positioned on the Rod 4 so that once during each revolution of the 57-teeth Gear both the Gear and the Pinion 6 are in contact with and driven by the Worm. The Pinion 6 thus transmits drive to the Rod 4 through the fixed Pinion 5, for approximately one-fifth of each revolution of Gear 3. To ensure this the Pinions must be mounted on their Rods with their bosses pointing away from the Gear 3 as shown. In Corley's original model the drive to the winding shaft of the pile-driver was transmitted through a further reduction gear having a ratio of 6:1.

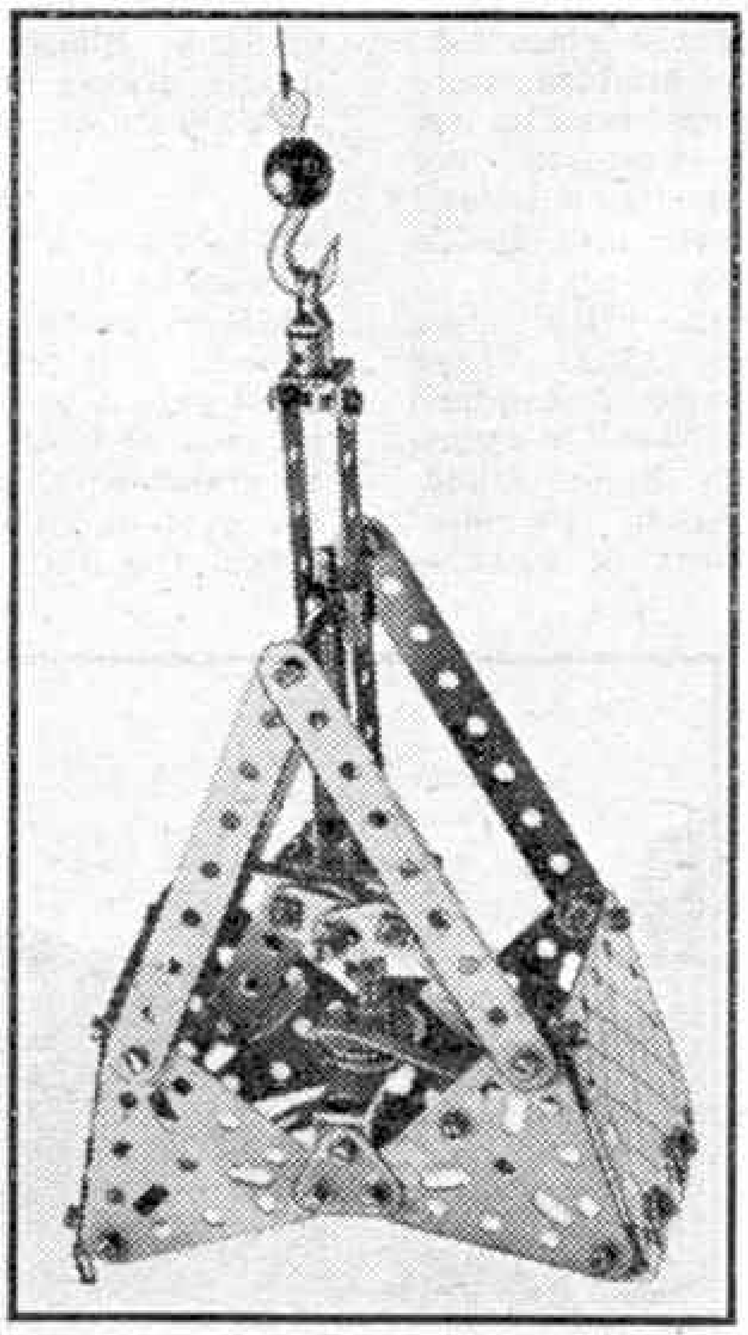
Corley says it is possible to modify the above arrangement to give faster working by replacing the Coupling with a Bush Wheel, which is attached to the 57-teeth Gear by 1" Screwed Rods. Two or three Pinions can then be mounted between the Gear and the Bush Wheel.

A SINGLE SUSPENSION CRANE GRAB

N. C. Ta'Bois, Woodford Green, sends the following details of a novel crane grab he has designed. It is a very simple arrangement based on the single suspension principle, and its special feature is that it is self-contained and therefore can be attached to the hoisting cord of any model crane.

The jaws, which are constructed as shown, are joined by 1" Triangular Plates to which is bolted a 2½" × ½" Double Angle Strip, gripped between a 1" fast Pulley and a Collar on a 5" Axle Rod. A 1½" Angle Girder is bolted to a 1½" Strip, and two ½" × ½" Angle Brackets. These carry 4½" Strips joined at their upper ends by a Double Bracket, to which is bolted an End Bearing for hoisting. One of the 4½" Strips passes through an Eye Piece in which the 5" Rod is free to slide. The Eye Piece is attached to the 4½" Strips supporting the jaws by two 1⅛" Bolts. Nuts lock these Bolts to the Eye Piece and the Strips pivot freely.

Two 2" Strips have a Pawl without boss attached to them at one end and at the other carry a ½" Bolt. One of the Bolts passes through the 1½" Angle Girder and carries a Flat Bracket attached by its round hole. The other ½" Bolt carries two Washers, which are placed on its shank before the Flat Bracket is attached. A ⅜" Bolt is fixed to this Bracket by two nuts, and its shank passes into the elongated hole of the other Flat Bracket.



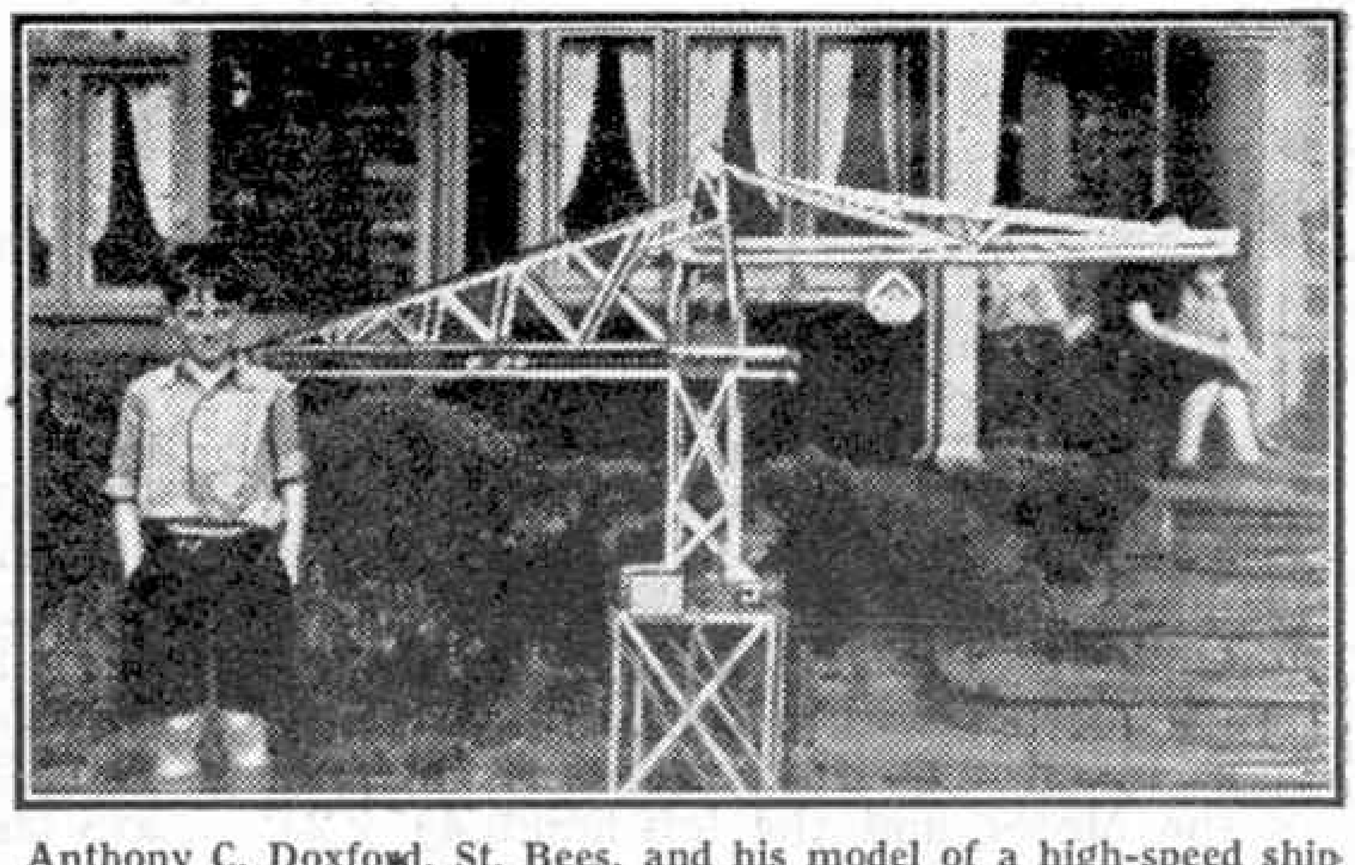
This single suspension crane grab was designed by N. C. Ta'Bois, Woodford Green, and has several novel and interesting features.

A Pendulum Connection gripped between one of the ½" × ½" Angle Brackets and the 1½" Strip already mentioned, is bent slightly and presses on the right-hand Flat Bracket. Both Brackets are thus pressed down and the 2" Strips and Pawls are held free of the 1" Pulley. The head of the ⅜" Bolt joining the two Flat Brackets is pushed upward by a second Pendulum Connection fixed to one of the 2½" Triangular Plates by a ½" × ½" Angle Bracket.

The action of the grab is as follows. The grab descends with the jaws open, but when it reaches the ground the unit carrying the 1½" Angle Girder, 2" Strips and Pawls, slides down the 5" Rod and the Pawls engage under the 1" Pulley. When the hoisting cord is hauled in, the grab is supported by the 1" Pulley and the jaws close. The load is now transported to its destination and lowered. On touching down the Pawl unit drops sufficiently to allow the Pawls to disengage from the 1" Pulley, which is possible owing to the Pendulum Connection fixed to the Triangular Plate now being held clear of the ⅜" Bolt. If the hoisting cord is now wound in, the Pawl unit rises and lifts the grab by the Eye Piece, so opening the jaws.

The device is fitted with two

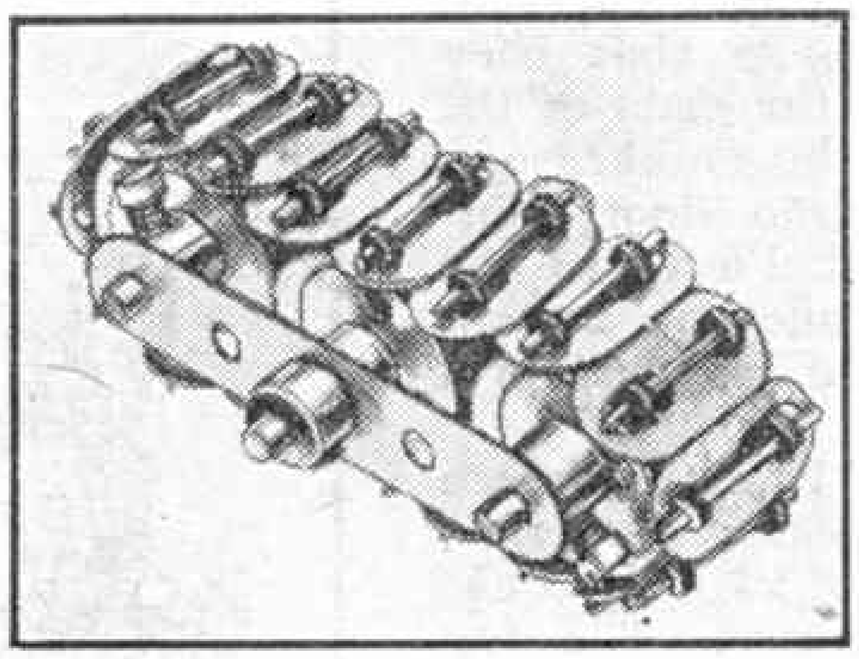
refinements that contribute to successful and smooth working. One is a Collar on the 5" Rod placed about ½" above the 1" Pulley. This prevents the Pawl unit from falling too far and the 2" Strips from being forced apart by the Pulley and becoming loose on their Bolts. The other refinement is a Formed Slotted Strip, which keeps the load material, such as sand or soil, away from the Pawls. This Strip is attached as follows. A ¾" Disc is slipped on to a ⅜" Bolt passed between the 3" Rods pivotally uniting the 2½" and 1" Triangular Plates. The Formed Slotted Strip is then placed on the shank and secured by a nut. The 3" Rods therefore are gripped between the Disc and Strip.



Anthony C. Doxford, St. Bees, and his model of a high-speed ship coaling plant. The model is driven by two 20-volt Electric Motors.

CREEPER TRACK—SUGGESTED METHOD OF CONSTRUCTION

S. Rogers, Portsmouth, is interested in the construction of model vehicles fitted with creepers, and has written to me asking for suggestions for making suitable tracks. There are of course many different ways in which creeper tracks can be built up from Meccano parts, and the most suitable method in a particular case will be decided by the scale of the vehicle and the Meccano parts available to the builder. One very useful type of creeper is shown in the centre illustration on this page. This is suitable for use on small models and is quite simple to assemble. It was devised some years ago by a keen model-builder, M. Morris, Burnley. Two Driving Bands are threaded through the holes in Flat Brackets and held in place by short pieces of wire in the manner indicated. The complete track is arranged so that the Driving Bands fit in the grooves of pairs of 1" fast Pulleys fixed on 1½" Rods journalled in 2½" Strips. The middle pair of Pulleys support the centre part of the track and they are all spaced apart on their Rods by Washers. The wires and the Driving Bands provide a good grip on the ground, and a model fitted with tracks of this type should be able to climb quite steep inclines.



Creeper track suitable for medium-size tractors and other vehicles.

AN EPICYCLIC GEAR BOX FOR MOTOR CARS

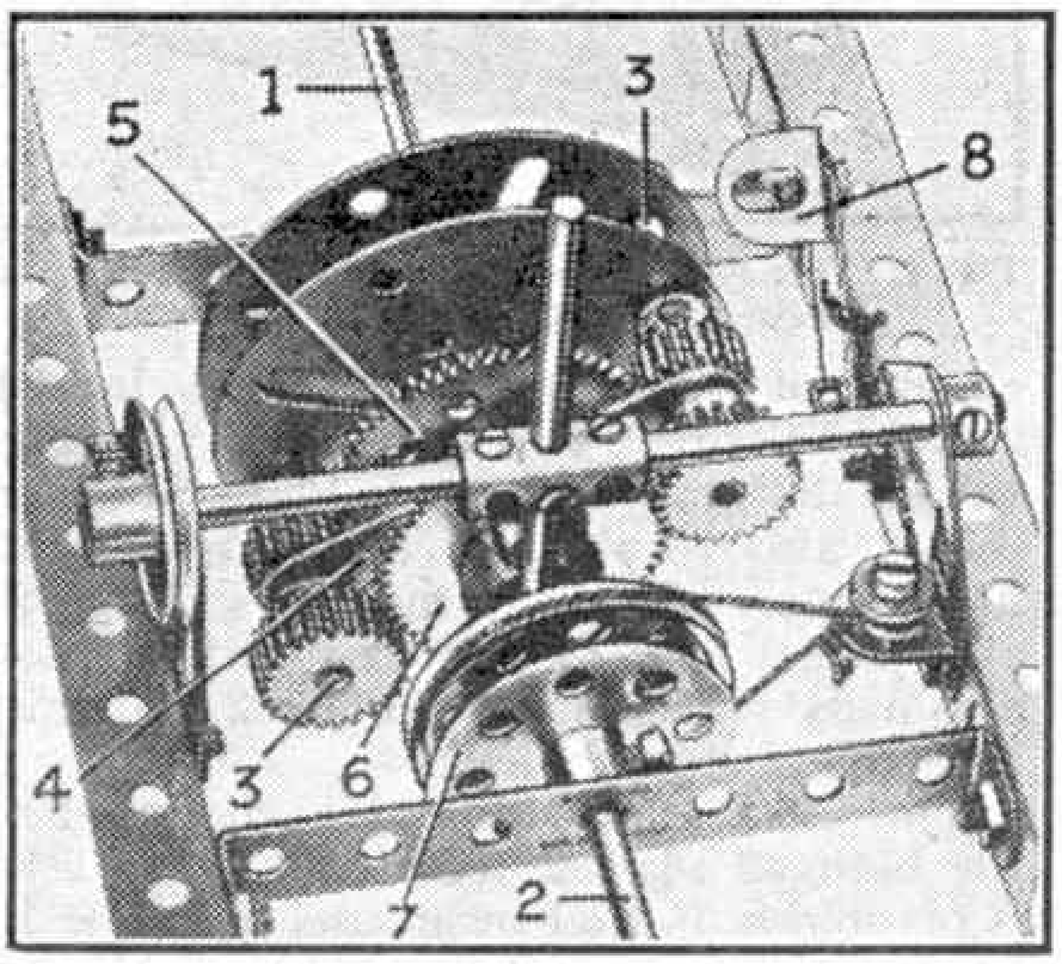
Model-builders experimenting with motor chassis construction should try out the epicyclic gear-box shown on this page. It provides an interesting variation and possesses advantages over the more orthodox gear-boxes, chief of which are the smoothness with which the drive is taken up and the fact that all the gears are in constant mesh.

The gear-box is shown mounted between the side girders of a Meccano motor chassis. The driving shaft 1 carries two Face Plates, which are spaced about ½" apart and carry two 2" Axle Rods 3. Each of these Rods is fitted with a ½" and a ¾" Pinion, and a 2½" Strip 4 placed between them. The Rods are held in place by Collars, and it is important that they are free to rotate.

The driven shaft 2 is passed through the centre hole of the Strip 4, and is inserted in the boss of the Face Plate on Rod 1 for a short distance to keep it correctly centred. A 57-teeth Gear 5, fixed on the Rod, is spaced from the Face Plate by a Washer and from the Strip 4 by three Washers. The 50-teeth Gear is held in a Socket Coupling in which a 1½" Pulley also is secured. The Socket Coupling unit is free on the Rod 2, and a Collar is placed between the Gear 6 and the 2½" Strip. A length of cord is tied to an Angle Bracket fixed to the frame and passed around the 1½" Pulley, and then is led around a ⅜" Bolt, which is fixed by two nuts to the Angle Bracket and carries two Washers to hold the cord in place. The cord is finally tied to a foot pedal 8, consisting of a pivoted 1½" Strip to which an Angle Bracket is bolted. A Bush Wheel 7 is fixed on the driven Rod, and the shanks of bolts fitted to the 1½" Pulley can be made to engage the holes in the Bush Wheel to form a dog-clutch.

The Socket Coupling unit is free to slide on its Rod and its movement is controlled by a hand lever consisting of a 2½" Axle Rod. The lever is held in a Coupling carrying two 2" Rods that are journalled in Flat Trunnions bolted to the side girders.

To engage low gear the hand lever is pulled back, thus disengaging the dog-clutch, and the foot pedal is depressed to apply the brake to the 1½" Pulley, which is held stationary. Top gear is engaged by releasing the foot pedal and moving the hand lever forward. This engages the dog-clutch and gives a "straight through" drive, as the two Gears 5 and 6 become solid on the driven Rod 2.



An epicyclic gear-box that gives two speeds and is suitable for use in a motor chassis.

New Meccano Models

Oil Engine—Hammerhead Crane

THE working model heavy oil engine illustrated in Fig. 1 is begun by building up the base. On this two $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates are mounted, and their flanges are joined by two $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plates. The E120 Electric Motor is mounted in the box so formed and its pinion meshes with a 57-teeth Gear fixed on a $1\frac{1}{2}''$ Rod journalled in the sideplate of the Motor and the left-hand $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plate. The Rod carries also a $\frac{1}{2}''$ Pulley.

The top of this box is partially covered by $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates, which are fixed so that a space is left between them for the Driving Band operating the crankshaft. Two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plates are secured by Strips to the upper edges of the $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plates, so that they protrude upward to form the ends of the crankcase. The front of the crankcase is provided with an inspection door, consisting of a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plate, to the centre of which a 2″ Pulley is bolted, and its handle is a 1″ Rod fastened in a Handrail Support.

Two Hinges and Angle Brackets fasten the door to a frame consisting of Strips, which is fastened to the two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plates of the crankcase. The top of the crankcase is covered by two $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plates, fixed in position with a space between them in which the piston can work.

The crankshaft is next built up as shown. The connecting rod is a 2″ Rod locked in a Coupling forming the "big end," and to it a $4\frac{1}{2}''$ Rod is pivotally secured by a Swivel Bearing to represent the piston rod. The crank webs are Couplings fastened on the ends of two 4″ Rods.

A Boiler is used for the cylinder, and the piston rod moves up and down in guides formed by the centre holes of two $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips fixed inside the Boiler.

Parts required to build model Oil Engine: 2 of No. 3; 4 of No. 5; 1 of No. 10; 19 of No. 12; 4 of No. 15a; 1 of No. 16; 1 of No. 17; 5 of No. 18a; 1 of No. 18b; 3 of No. 20b; 2 of No. 21; 1 of No. 22; 1 of No. 27a; 55 of No. 37a; 14 of No. 38; 2 of No. 48; 2 of No. 51; 3 of No. 52; 3 of No. 53; 7 of No. 59; 3 of No. 63; 2 of No. 72; 1 of No. 103d; 2 of No. 109; 4 of No. 111a; 2 of No. 118; 2 of No. 130; of 1 No. 136; 2 of No. 136a; 1 of No. 160; 1 of No. 162; 1 of No. 162a; 2 of No. 163; 1 of No. 164; 1 of No. 165; 2 of No. 166; 1 of No. 186; 1 E120 Electric Motor.

The Hammerhead Crane is illustrated in Fig. 2. The tower is constructed as shown, and a 3″ Pulley 3 is bolted to it. The main members 1 of the swivelling boom each consist of two $12\frac{1}{2}''$ Angle Girders overlapped three holes, and they are connected at one end by a $3\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip, and at the other end by a $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate. A $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip is then bolted to the first Double Angle Strip, and to its lugs are fastened $12\frac{1}{2}''$ Strips, the free ends of which are attached to the girders 1.

The girders 1 are now connected with the lower members of the boom, which

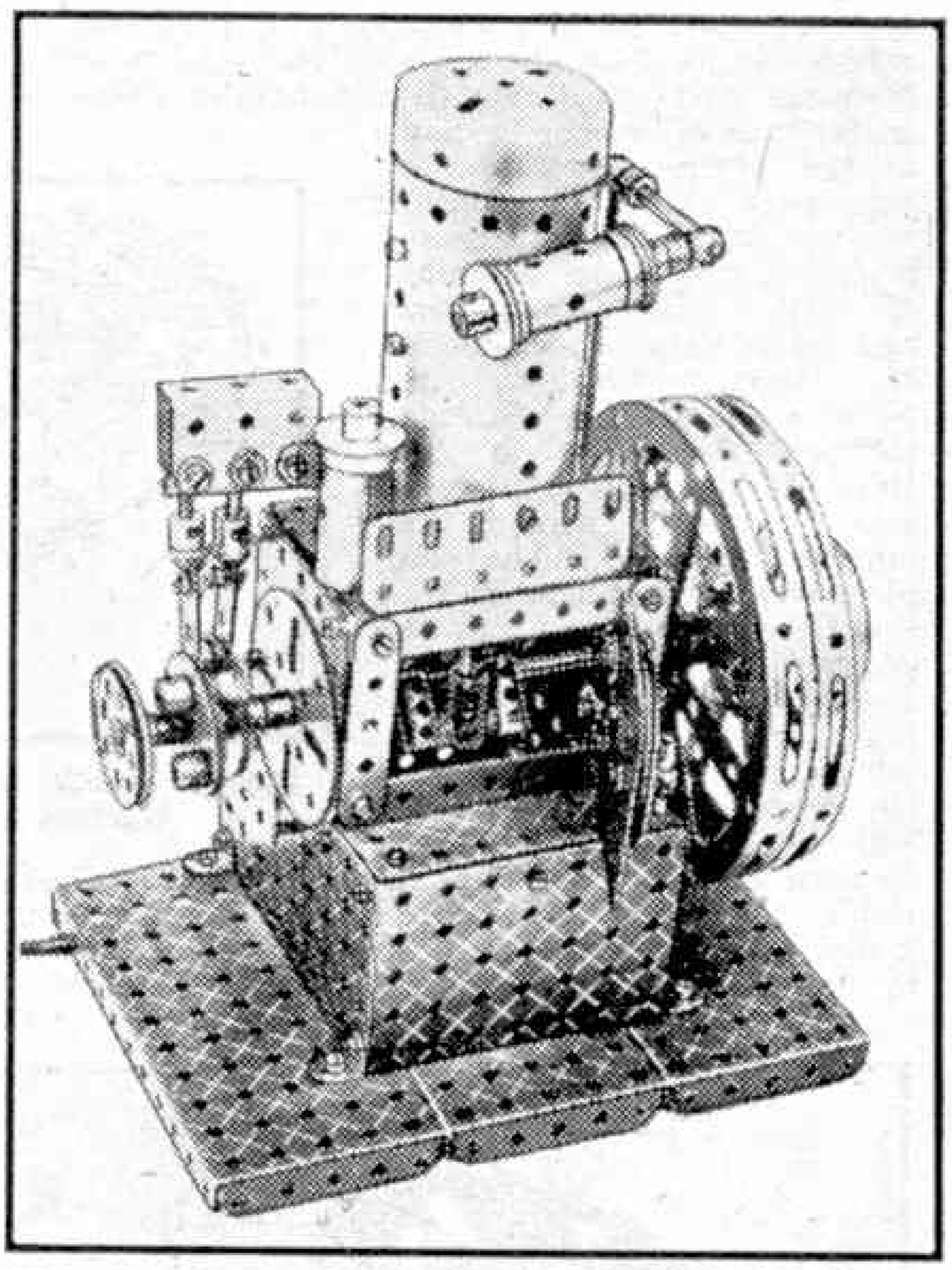


Fig. 1. This model heavy oil engine is driven by an Electric Motor concealed in the base.

consist of $12\frac{1}{2}''$ Strips extended by $2\frac{1}{2}''$ and $5\frac{1}{2}''$ Strips. The latter are connected to the $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate, and are joined also to the $2\frac{1}{2}''$ Strips by further $5\frac{1}{2}''$ Strips. The lower members of the jib are joined by $3\frac{1}{2}''$ Strips that support also a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate 2, to which is fastened a 3″ Pulley.

The Clockwork Motor 4 is mounted on the Flanged Plate 2, and to its brake lever is pivoted a 5″ Rod by means of Collar 10. In a similar manner an $11\frac{1}{2}''$ Rod 9 is pivotally attached to the reverse lever of

the Motor. Both Rods protrude through the $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate at the rear end of the jib and are each fitted with a 1" Pulley.

The jib is pivoted on a $3\frac{1}{2}''$ Rod locked in the boss of the upper 3" Pulley and retained in position by a Spring Clip below Pulley 3.

The hoisting trolley is a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate, to each flange of which is bolted a $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip. The latter provide bearings for the $3\frac{1}{2}''$ Rods that carry the $1\frac{1}{4}''$ Discs forming the wheels. Trunnions bolted to the Flanged Plate carry a 2" Rod, on which are two 1" loose Pulleys.

Cord 8 is tied to the rear of the trolley, then wound a few times round Crank Handle 7 and led around a $3\frac{1}{2}''$ Rod journalled at the front end of the jib. It is then tied to the front of the trolley.

The hoisting drum 5 is driven in the following manner. A $\frac{1}{2}''$ Pulley on the Motor shaft is connected by a Driving Band to a 1" Pulley fastened on a 2" Rod journalled in the side plates of the Motor. A second Driving Band connects the 2" Rod to a 1" Pulley on Rod 5. The hoisting Cord 6 is tied to a Cord Anchoring Spring on Rod 5 and is led over one of the 1" Pulleys in the hoisting block, over the second 1" Pulley in the hoisting trolley and finally is tied to the boom.

The sides of the control cabin consist of $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates joined at the rear by a $3\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip and two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates.

Parts required to build the model Hammerhead Crane: 12 of No. 1; 14 of No. 2; 4 of No. 3; 2 of No. 4; 8 of No. 5; 2 of No. 6a; 4 of No. 8; 4 of No. 11; 16. of No. 12; 4 of No. 12c; 1 of No. 13; 1 of No. 15; 1 of No. 15a; 4 of No. 16; 2 of No. 17; 2 of No. 19b; 1 of No. 19h; 4 of No. 22; 2 of No. 22a; 1 of No. 23; 1 of No. 23a; 14 of No. 35; 105 of No. 37; 5 of No. 37a; 12 of No. 38; 2 of No. 40; 2 of No. 48; 1 of No. 48a; 2 of No. 48b; 1 of No. 51; 1 of No. 52; 2 of No. 53; 2 of No. 54a; 1 of No. 57c; 4 of No. 59; 2 of No. 111; 1 of No. 111a; 2 of No. 111c; 2 of No. 125; 2 of No. 126; 2 of No. 126a; 1 of No. 147b; 2 of No. 155a; 2 of No. 186; 2 of No. 187; 4 of No. 189; 4 of No. 190; 4 of No. 192; 1 of No. 198; 4 of No. 217a 1 No. 1a Clockwork Motor.

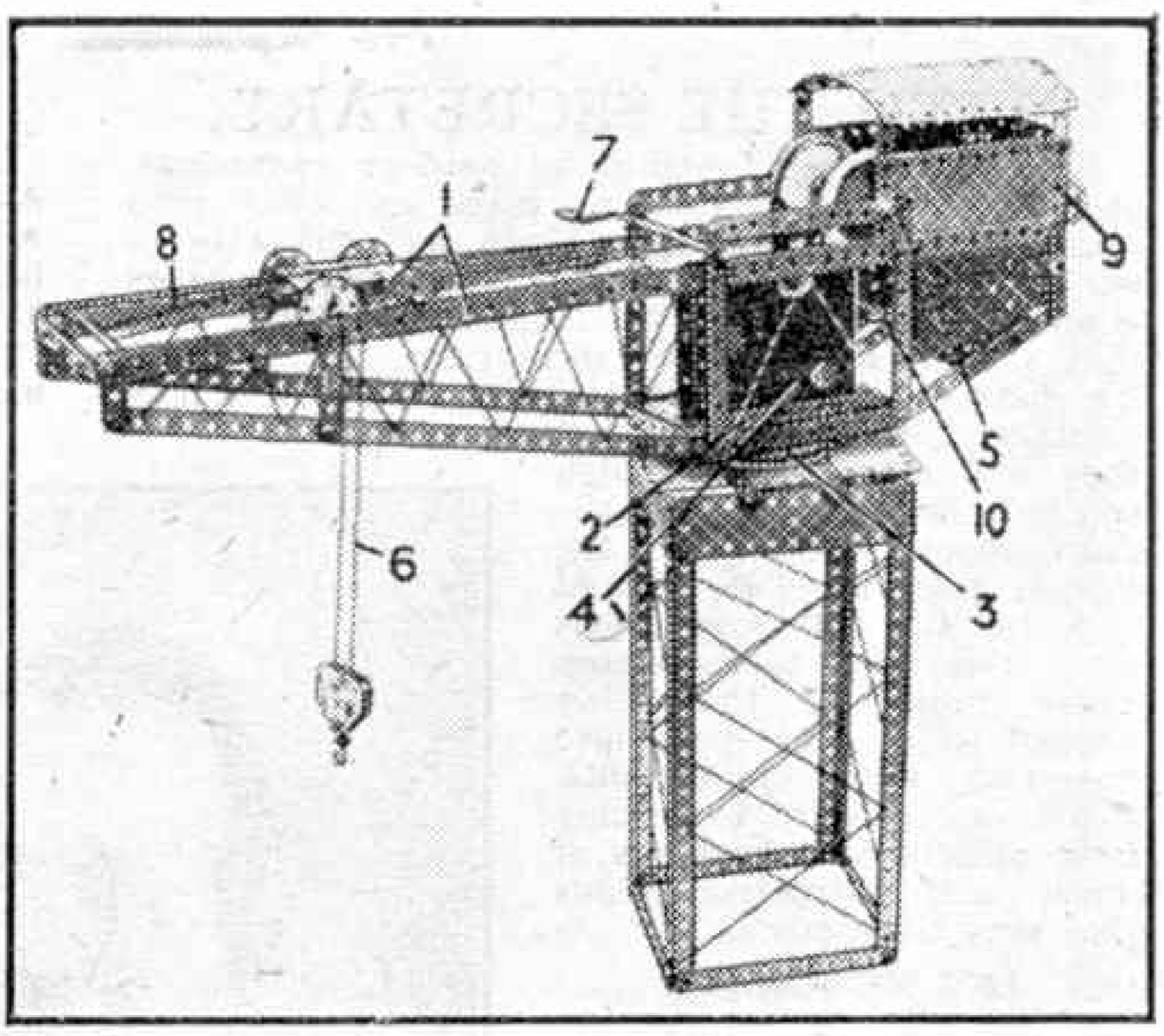


Fig. 2. A model hammerhead crane powered by a No. 1a Clockwork motor.

Novel Model-Building Contest

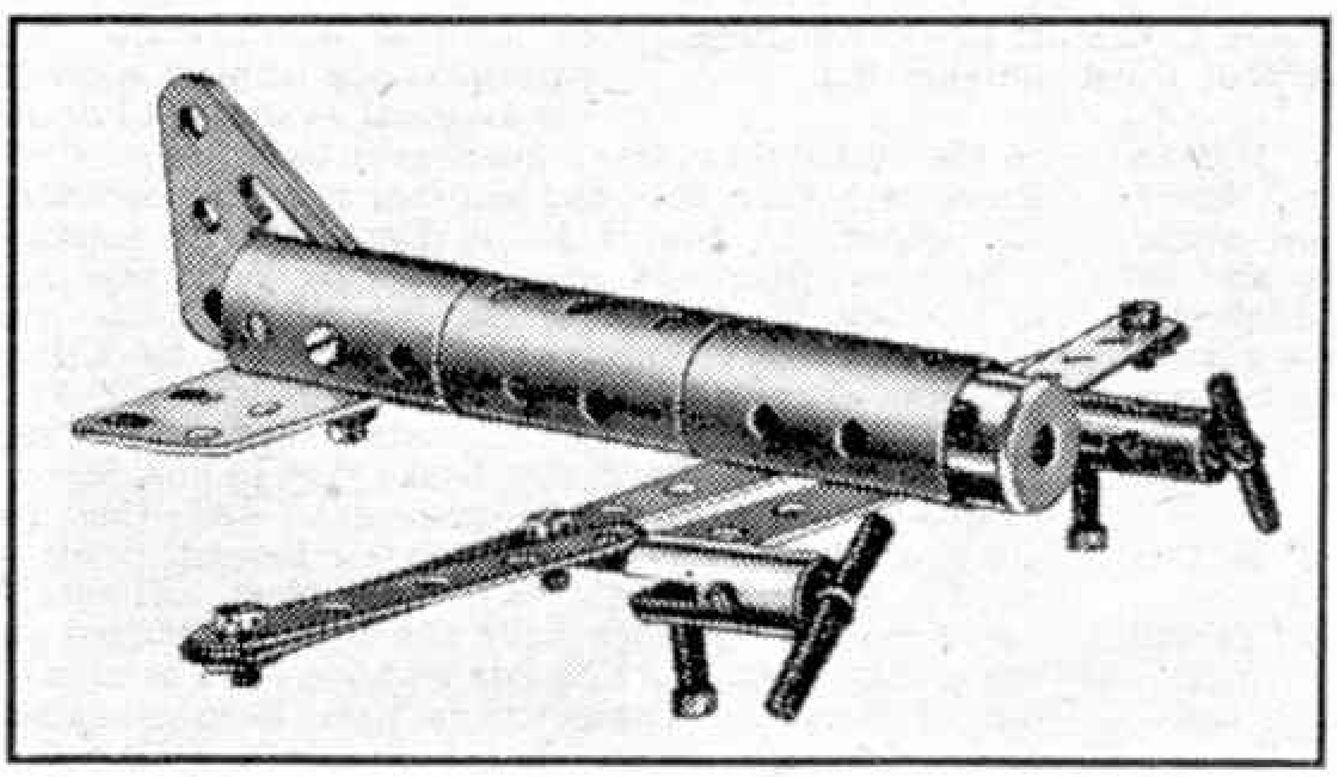
We wish to remind readers that there is still time to submit entries for the novel "*Birds and Beasts*" Model-Building competition announced in the "*M.M.*" for July. In this Contest models of all living things—except human beings—may be entered. Curiously life-like models of this kind can be constructed from Meccano parts, and the competition offers very wide scope for originality.

Competitors may build their models either solid or in the flat to resemble a drawing, according to their wishes and the quantity of Meccano parts available. Any number of parts may be used.

After completing their models competitors should send either photographs or good sketches of them to "*Birds and Beasts Model-building Competition, Meccano Ltd., Binns Road, Liverpool 13.*"

The Contest will be divided into two sections—A, for competitors of all ages living in the British Isles; B, for competitors of all ages living overseas. The closing date for Section A is 31st August 1945, and for Section B, 28th February 1946.

The Prizes offered in each section are as follows. First, £2/2/–; Second, £1/1/–; Third, 10/6. There will be also several consolation awards.



This miniature model transport monoplane won Third Prize for C. E. Wrayford, Bovey Tracey, in the May "Simplicity" Competition.

Club and Branch News

WITH THE SECRETARY

I have just been reading of outdoor excursions, games of cricket, boating on lakes and cycle runs that have been enjoyed by Clubs and Branches in various parts of the country. I hope that members of all these organisations are devoting all the fine days that they can to outdoor recreations of this kind. By doing so they will learn to know their fellow members better, and later on they will return full of high spirits and energy to the Club room pursuits of the Winter Sessions. They should also be full of good ideas when this time comes along. These must be thoroughly worked out, and put into operation where practicable, and I look forward to hearing from officials and members of novel and attractive plans that they have made.

LET ME KNOW!

I should like to add a note about reports. These are of the utmost importance, for what is being done in any Club or Branch is of the greatest interest and value to others. Some Clubs I hear from only rarely; from others I get full accounts of splendid activities, but these reach me about once a quarter, which means that the stories they have to tell are very old before they reach the Guild and H.R.C. page of the "*M.M.*" The ideal is something in between, preferably a shorter report sent in monthly, and I urge all secretaries to keep this in mind now, as well as during the coming Winter Sessions.

I hope it will not be long before I shall have more space in which to give reports, but I shall only be able to fill this, to the advantage of all enthusiasts, if officials play their parts. If the secretary has so many things to do that he cannot spare time for completing reports he should follow a plan I have often suggested. This is to appoint a special report secretary to take over this duty. An assistant would soon add other duties to this simple task, and so would gain valuable experience that would qualify him to take over the full duties of secretary with every confidence if at any time a change became necessary.

Mr. V. Miller is Leader of the Islington M.C., of which he was the founder. The Club was affiliated in 1935, and had a very successful career up to the outbreak of war. Then its headquarters were twice bombed, and members were lost by evacuation. Mr. Miller throughout, kept in touch with as many members as possible, visiting them in their homes, and meetings have now been resumed. Those wishing to rejoin the Club should write or call at 3D Block, Samuel Lewis Buildings, Liverpool Road, London N.1.

PROPOSED CLUBS

BLACKROCK—Mr. J. C. W. Freeman, "Iona," Menloe Gardens, Blackrock, Cork, Eire.

KIRKBY LONSDALE—Mr. A. Livesley, Queen Elizabeth School, Kirkby Lonsdale, Via Carnforth, Lancs.

BIRCHGROVE—Mr. K. W. Jones, 43, Pantbach Road, Birchgrove, Cardiff, Glam.

GREENFORD—Mr. P. Hunt, 36, Halsbury Road East, Northolt Park, Greenford, Middlesex.

CLUB NOTES

DURHAM M.C.—The Club room has been decorated. A Club Bank has been organised to pay for excursions. A Hornby Train Section has been formed, and work begun on a terminal station. Club roll: 6. *Secretary:* T. C. Hindson, Westholme, Durham Moor, Durham.

HORNSEA M.C.—The Senior Engineers have finished making their lamp standards. The Junior Engineers have had talks illustrated by the epidiascope, and Lantern Lectures and Film Shows have been given to other sections. The Junior Scientist section has been revived. Games have been played, and cricket and boating on the mere have been the chief pursuits outdoors. Club roll: 44. *Secretary:* C. Kemp, 5, Carlton Terrace, Hornsea.

BRANCH NEWS

MORDEN—Splendid meetings have been held regularly. Most of these were for track operations. Others were devoted to extending the track, making scenery and building a viaduct. One meeting was devoted to cleaning and oiling of all stock to make sure that running to timetable could be carried on. Meetings are held on Tuesdays at 6 p.m. and new members will be welcome. *Secretary:* P. C. Haines, 86, Camborne Road, Morden, Surrey.

LARGS MINIATURE RAILWAY—Trackside meetings have continued with great success. Other events included a Stamp Night, as a result of which a Stamp Section is being formed. The Library has been re-arranged to make it more useful, and indoor games have been played. *Secretary:* G. Kidd, 22, Barr Crescent, Largs, Ayrshire.

STUART ROAD (EAST BARNET)—Efforts are being made to find larger premises and to increase membership. Experiments are being made with the material available to decide on the best form of track for Branch operations. Cycle Runs have been the chief outdoor pursuit. *Secretary:* A. Loader, 12, Stuart Road, East Barnet, Herts.

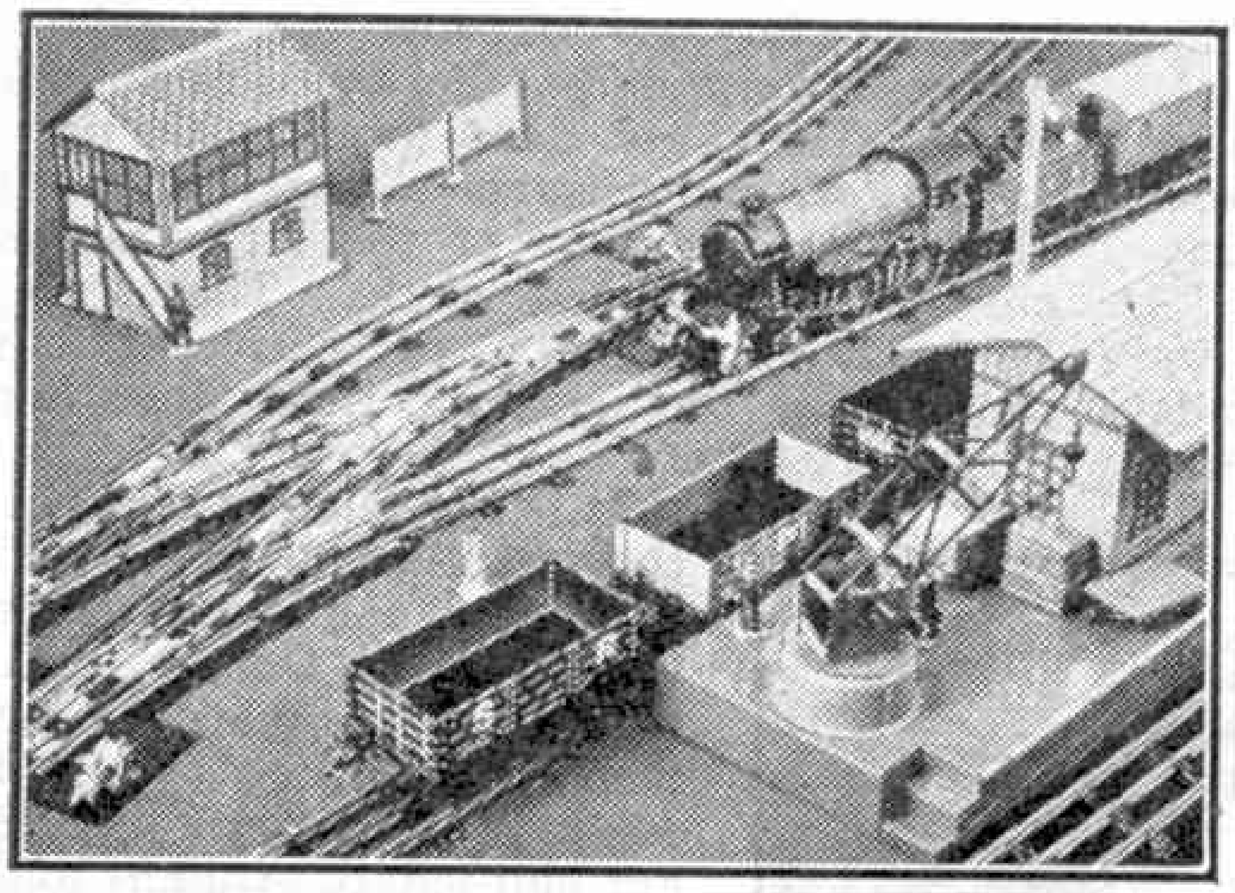
SLOUGH—Meetings are now being held regularly in the new headquarters. An electric track has been laid down and trains run on it include an L.M.S. Glasgow express and the G.W.R. "*Bristolian.*" It is hoped to visit the G.W.R. engine sheds at Slough. *Secretary:* P. R. Gillard, 306, Stoke Poges Lane, Slough.

MUNDELLA SCHOOL (NOTTINGHAM)—At the first meeting of this newly incorporated Branch positions on the Branch railway were allocated. Timetable operations on the track have already been started and are greatly enjoyed. Lineside features have been made out of Meccano. Competitions have been organised, and a Lantern Lecture has been given, while visits have been made to places of railway interest. *Secretary:* R. Harris, 93, Linton Boulevard, Nottingham.

More Fun From Your Hornby Railway

A Few Ideas on Stations

STATIONS form a very necessary part of the equipment of a miniature railway system. Without them our trains would have no real starting point and no destination; and the track, instead of representing a miniature railway, would become a mere "test road." To run a realistic train service is



A realistic section of a Hornby layout. Note the Goods Platform used as an island between two tracks.

or should be, the aim of every Hornby Railway operator, and in order to do this some attention must be paid to the arrangement and layout of stations.

On a plain oval track of restricted dimensions there is not much choice in the matter of position for a station platform and buildings. It is usual to arrange the station alongside one of the straight sides of the oval, which in any case is probably the best place for it. Stations on curves are not successful in miniature, unless the curves of the track are very gentle, and in any event such stations have to be made at home as the standard Hornby Station platforms are straight. With curves of the standard radius, even those of the Steel Track which have a radius of 3 ft. 2 in. approximately, the overhang of bogie-fitted locomotives and coaches would create difficulties.

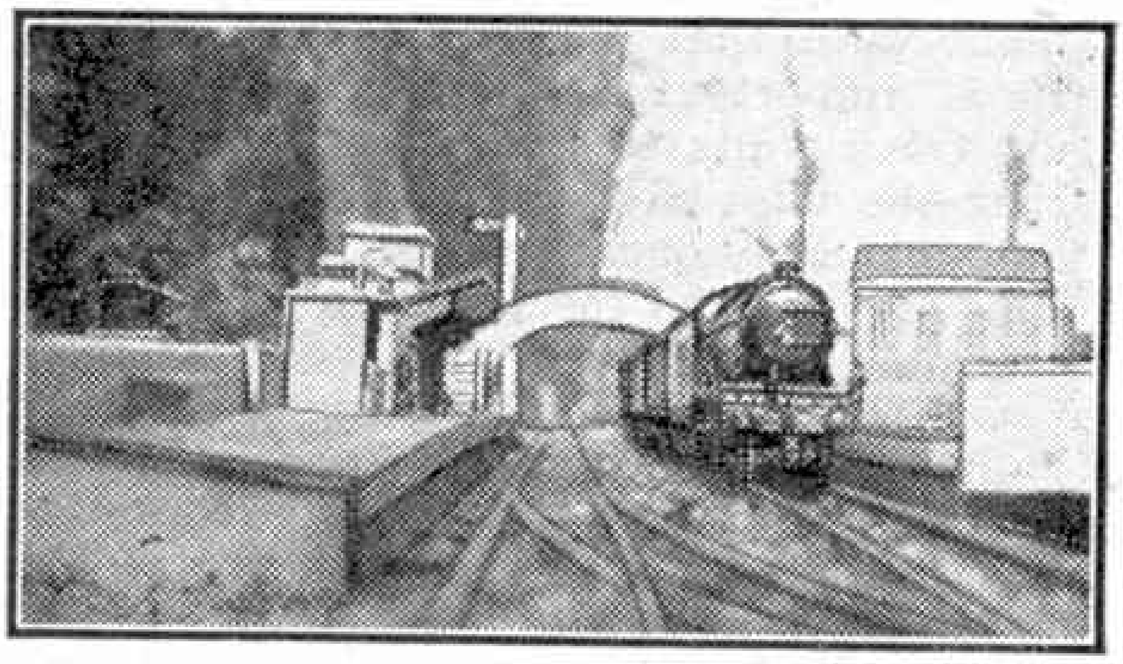
We can do a great deal, however, to remove the impression that the station has simply been planted down in the only available place. A level crossing or a footbridge, or both if space allows, and a signal cabin close at hand, will help matters considerably, even on a temporary layout. The use of a crossing means that a certain amount of "road" must be arranged on either side of the line, and this involves the use of hedging or fencing and if possible a road vehicle or two and a few "people." None of these items having been available for a long time, many boys have developed schemes for making such items reasonably well at home. Cardboard, matchsticks, bits of wire and Plasticine, with a little paint to finish off, can be very useful to the miniature railway owner who has a little patience and ingenuity. By such means indeed the station platforms may be peopled and also provided with luggage and similar items!

The exact form and layout of the station will depend to a great extent on its supposed situation and its degree of importance. For a simple halt on a single line of track one of the M Series buildings can be used, or failing that perhaps we can fix up something similar at home. A halt more in keeping with the larger Hornby locomotives and rolling stock could be made up with a length of the standard Passenger Platform complete with Paled Fencing. A Platelayer's Hut or some similar modest structure could be used to represent the "office" portion of the halt, this being placed at the foot of one of the end ramps by which passengers enter and leave the station.

While many stations in miniature are single-platform affairs, even when they are not merely simple halts like those just described, a good deal of interest and realism is gained if we can manage to double the track through the station. Even though a simple passing loop only is formed, a far more busy and important air is given to the station as a whole when each track serves its own platforms. Quite a good arrangement for the average wayside station is to use a standard Hornby Station, or a similar home-built structure, to serve one side of the loop; the other side can consist of a plain platform with fencing if desired. If the plain platform is placed on the operator's side of the track a good uninterrupted view of all that is going on will be afforded; the buildings on the opposite side of the station will form an effective background for the train.

A more important place can be provided with two similar station units, one on each side of the double track or loop, and a busy air of suburban activity is suggested at once. At any two platform stations a small detail that adds to the completeness of the scene is a reproduction of the timber-built crossing over the tracks that is invariably provided for the staff and for luggage barrows and so on. This is easily provided by means of strips of card cut to fit between the running rails and between each track respectively. In addition further pieces should be cut to be laid outside the tracks so that the whole crossing connects the lower ends of the platform ramps. The pieces of card can be painted or marked out in pencil or ink to represent timber.

Where a layout boasts of more than one station, interesting variation can be introduced by having one of them arranged as an island platform. This, as its name implies, is a platform situated between the two tracks, there being of course two platform faces. The island platform makes a neat and compact arrangement that does not require a great deal of space, and on this account is popular.



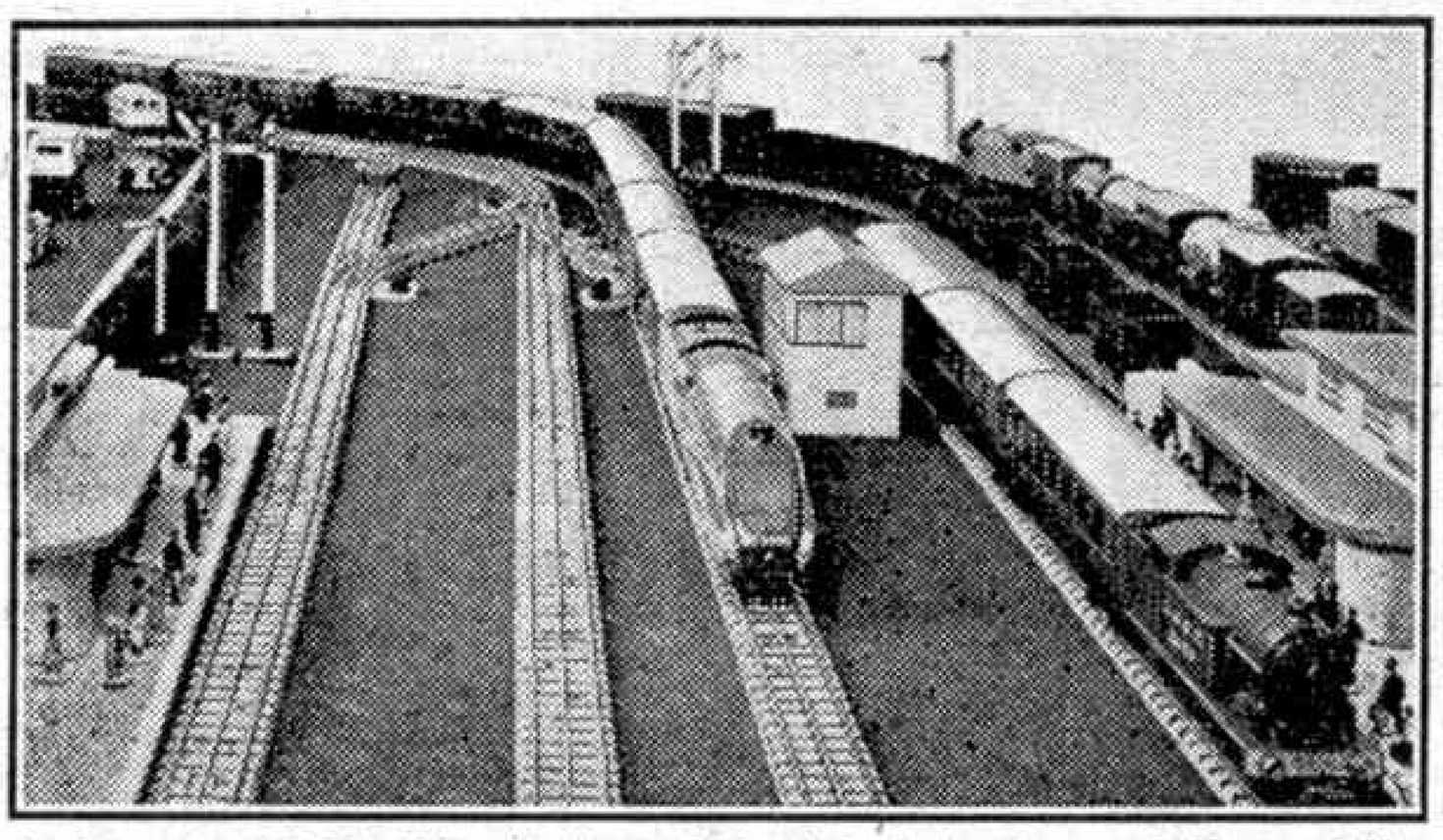
"Eastly," a typical two platform station. This is situated on the "Clifton Lines" operated by our reader "Rosco" as described in the "M.M." last month.

Track Hints for Dublo Owners

THE actual form of Hornby-Dublo track with its solid metal tinprinted base is no doubt familiar to all "*M.M.*" readers. It is important, however, in these days of used material, to be able to identify the actual Dublo product, as it is essential to the successful running of Dublo Locomotives and Rolling Stock. The running rails are solid and may be finished in the natural colour of the metal, which is brass, or they may have a nickelled finish, according to their age. The base of each piece of track is, however, clearly marked.

Running rails are kept in alignment by miniature "fishplates" into which the ends of the rails will fit. The different pieces of track are held together by specially shaped connecting clips fitted underneath the metal base. These clips also have the important duty of providing electrical connection between the centre conductor rails of adjacent units of track. Therefore if examining used track we should always make sure that these clips are present. It is important, too, when connecting up track units to make a layout to see that the clips are not bent or deformed; and that they engage properly and do not slip between the insulator on which they are mounted and the track base.

One of the most interesting features of Dublo track is the relation of the various parts to one another, for this governs the layout possibilities of the track as a whole. Before dealing with some points in this connection, however, it is necessary to say that for electric track curved rails of two different radii are included in the Dublo range. There are the standard curved rails, eight of which form a complete circle. A right-angle bend therefore at the corner of a layout involves two curved rails only. This is simple and convenient to remember when planning various formations. Then there are what are known as large radius curves; these are intended for use outside the standard curves, in forming parallel roads of double track. Their use does away with ugly formations and ensures a neat and well aligned road. Eight of the large radius curves also form a circle. There are, however, no points of corresponding radius, but the need for them does not arise very often.



An important Main Line Station. A local train is at one platform while a heavy express speeds through.

It is the relation between the standard curves and points and the straight rails that makes Dublo rack readily adaptable to so many formations. As in most track systems, there are half-length straight and half-length curved rails. The standard points are of the ordinary turnout kind, a curved branch leading off the main straight either to the left or to the right according to the "hand" of the points. The straight section of the points is equal in length to a straight half rail; similarly the curved branch of the points is equal in length and corresponds in radius to a curved half rail. The use of two points together of the same hand allows a cross-over to be arranged, and the distance apart of the straight tracks is the standard "six-foot" way for Dublo railways.

These details can be followed more readily from the accompanying diagram. Fig. 1 shows a single main line stretch off which a loop line is developed. At the right-hand end of the loop there is one set of points to the curved branch of which is added a curved half rail, forming a reverse curve and bringing the loop parallel to the main line. The left-hand end of the loop is formed of two sets of points together forming a crossover, and as the curved portions of the points correspond to a curved half rail the loop is maintained the correct distance apart from the main line. The extension of the

loop to form a "spur" terminated by buffer stops is made possible by the use of a crossover at this end of the loop. This extension may be useful in timetable working for holding an engine that is waiting for its next turn of duty, or a similar spur in a goods yard can be set aside for the stowage of goods brake vans. These vehicles often have a road of their own in a yard.

FIG. 1

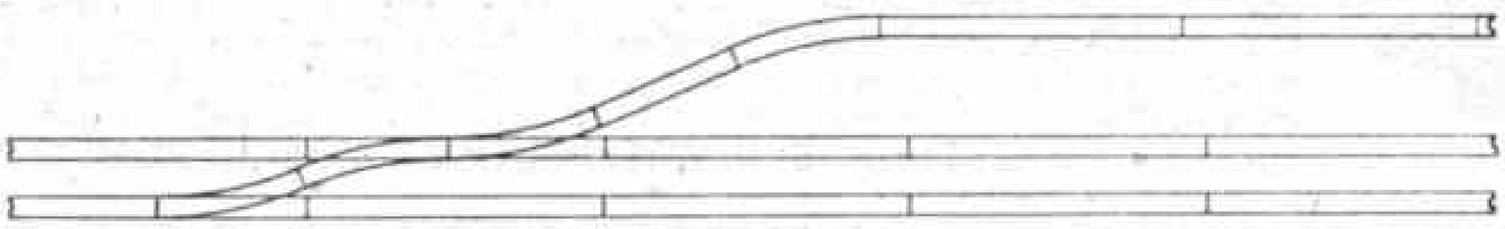


FIG. 2.

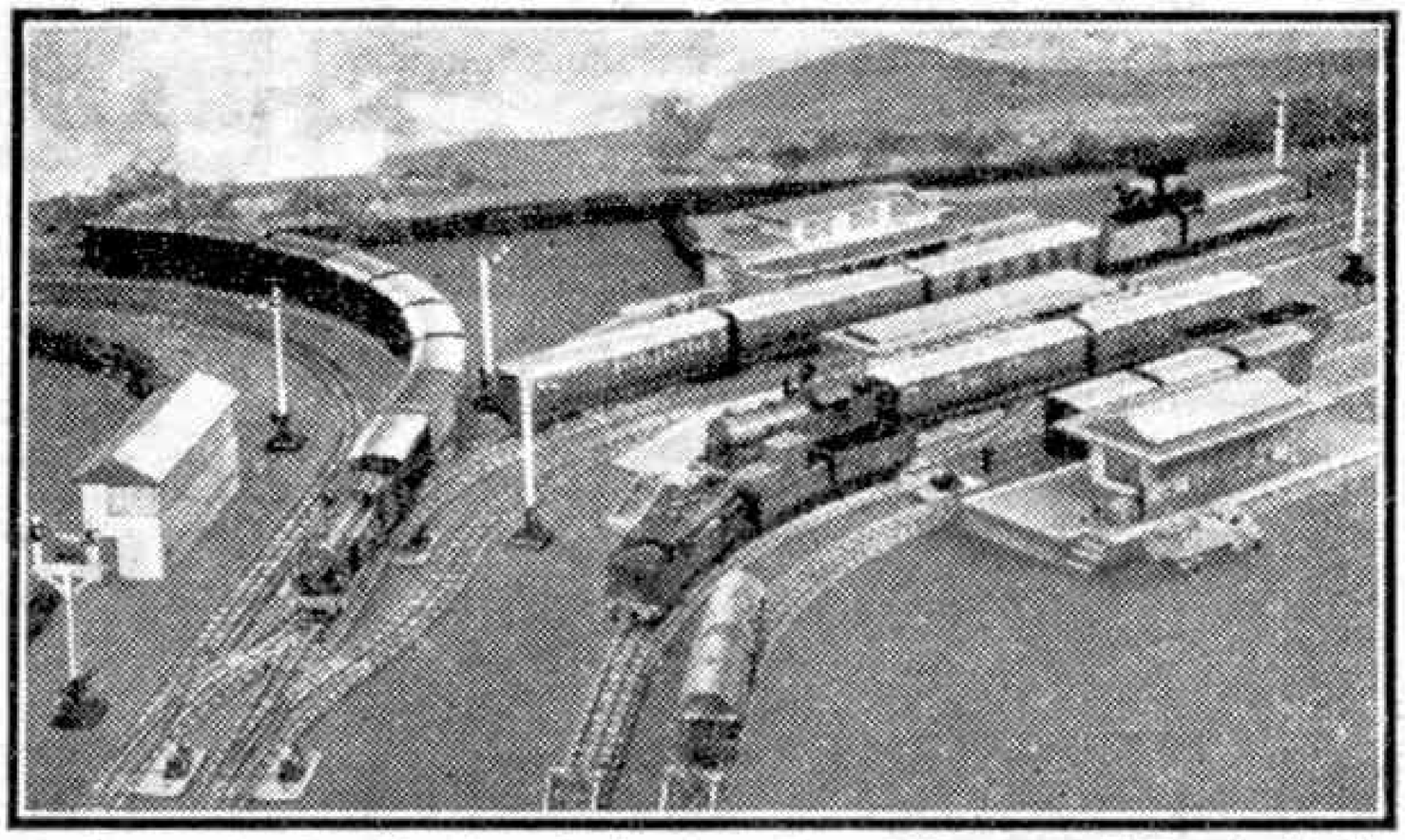
Diagram showing the layout details referred to in this article.

It will be seen that the inclusion of two points in the main line stretch has in effect displaced two straight half rails or the equivalent of one whole straight rail. As a result the length of the straight section of the loop is less by one whole rail than the corresponding section of the main line lying between the points. This holds good no matter how long the loop is, and is a useful thing to remember when planning a layout. A loop of this kind is useful in forming a crossing place where trains moving in opposite directions on a single line may pass one another. One of them waits of course while the other goes by. When planning a loop with such crossing operations in view we should always be careful to see that the loop will hold comfortably the longest train that we are likely to want to place in it. Otherwise we shall have to restrict trains to a given number of vehicles, or we shall have some pretty puzzles to work out!

Fig. 2 shows another arrangement in which what we may term practically the standard terminal lay-out for the Dublo City Station is laid down. The two main lines are connected by two points again forming a crossover; and a further set of points on the upper main line brings off another platform road. As these points come next to the crossover points, the rail joints on the two main lines into what would be the station come opposite to one another, so that the buffer stops end up in line also and a neat appearance results. The large island or centre platform of the City Station would be situated between the main line and the upper platform road. For this reason the next rail to the curved branch of the points is a straight half rail; then comes the curved half rail. This sets out the upper platform line the required distance to clear the wide platform, which of course would not be possible with the standard siding or loop arrangement as detailed in Fig. 1.

The position of the crossover and the other points make it possible for trains to be worked into and out of the upper platform road without difficulty. A departing train from the road would make use of the crossover to gain the "down main," and so preserve the British rule of "keep to the left."

Many intricate formations are possible with Dublo track. The lower illustration on this page is a good example of careful layout planning. A particularly interesting section is the double turnout over which the goods train is passing; this is formed by using four right-hand points with straight and curved half-rails.



An interesting junction layout showing some of the uses of Hornby-Dublo Points. A train is coming off the goods branch on to the main line.

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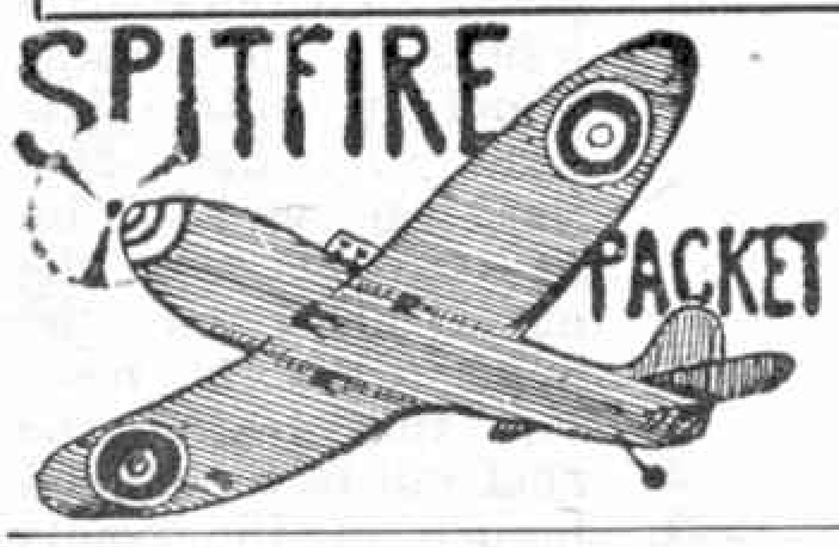

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For other Stamp Advertisements see also pages 282 and viii.

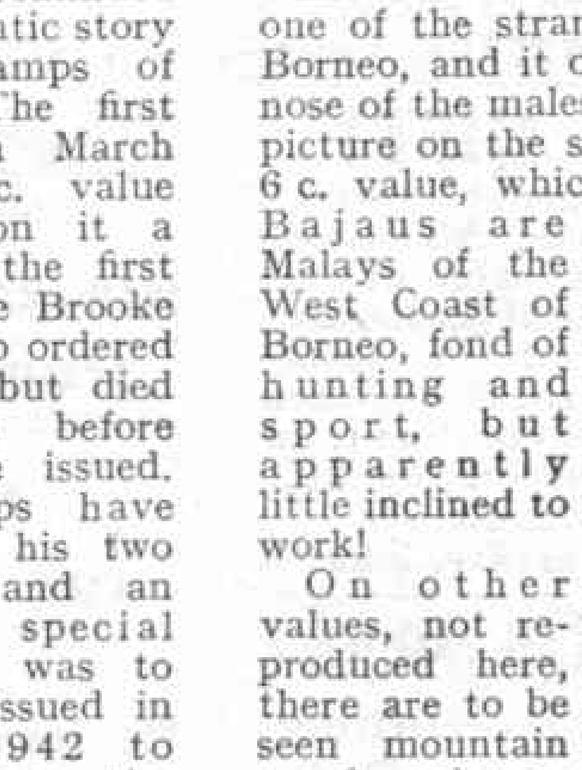
Stamp Collecting

Pictorials from North Borneo

By F. Riley, B.Sc.

IN our stamp tour of the Empire we pass now from the Malay Peninsula across the South China Sea to Borneo, exceeded in size among the world's islands only by continental Australia, Greenland and New Guinea. We associate Borneo with oil production and spices, strange animals and tropical plants of all kinds. It has many interesting native races, but it is no longer a nest of pirates as it was 100 years ago, when the head-hunting Dyak pirates were in their prime.

There has always been romance in the very name of the island, which in early days was a prize contended for by various European nations. The greater part of it is Dutch, but along the north coast are three British Protectorates, Sarawak, Brunei and North Borneo, while off its northern shore is the island of Labuan, now included in the Straits Settlements. Factories were established in Borneo by British companies 300 years ago, but later these were abandoned, and our interest in the island was not revived until the advent of Sir James Brooke, an English officer who actually became the sultan of an Eastern land. Brooke went to Borneo in 1839 to help the Sultan of Brunei to cope with Dyak pirates. He triumphed over these in a great struggle that lasted six years, and as a reward he was given the district of Sarawak, over which he and his successors ruled as Sultans. In 1888 Sarawak accepted a British Protectorate as far as external affairs are concerned, but otherwise remains an independent state.



We are reminded of this romantic story by the stamps of Sarawak. The first appeared in March 1869, a 3 c. value that had on it a portrait of the first sultan of the Brooke dynasty, who ordered the stamp, but died six months before it could be issued. Later stamps have portraits of his two successors, and an interesting special stamp that was to have been issued in January 1942 to commemorate the centenary of the Brooke dynasty carried portraits of all three.

The country was overrun by the Japanese, along with the rest of Borneo, and for more stamps of Sarawak we shall have to wait until the island is freed. The landings of Australian troops in Borneo bring this time nearer, and add to the interest of the stamps of the three countries with which we are concerned in this article. The first stamps of Brunei appeared in 1906, and were the stamps of Labuan over-printed. Specially designed Brunei stamps came out in 1907, since when there have been several interesting issues, but not much variety in design, for only two have been used, one showing a scene on Brunei River and the other a view of Brunei Town.

North Borneo, the third of the countries, has provided us with a real wealth of pictorial stamps that illustrate the life of the country, together with interesting designs of a more formal character carrying the arms of the North Borneo Company, which developed the country under a Royal Charter. Pictorials began as early as 1894, when a fine set of nine designs appeared. Two of these were arms stamps, and on the others were shown a Dyak chief, a roussa or Malay stag, an argus pheasant and a crocodile, with a sago palm, a Malay dhow and a view of a mountain to complete the series. The fashion thus set was maintained, succeeding issues including other fine pictorials as well as arms stamps. Thus we have a whole series of fine stamps illustrating the country, its plant and animal life and the peoples who inhabit it. The climax was reached with the 1939 set, which repeated some of the earlier designs and included some splendid new ones. All of them are in two colours and are handsome stamps that make a fine show in our albums.

Four values of the 1939 set are reproduced on this page. On the 1 c. value there is a native buffalo cart, the most interesting feature of which is that is has no wheels! On the 2 c. stamp there is a cockatoo, representative of the bird life of the Protectorate; while the 4 c. value shows us a proboscis monkey, one of the strangest of this tribe. It is peculiar to Borneo, and it derives its name from the huge fleshy nose of the males, which is well shown in the excellent picture on the stamp. A native race appears on the 6 c. value, which shows two mounted Bajaus. The Bajaus are Malays of the West Coast of Borneo, fond of hunting and sport, but apparently little inclined to work!

On other values, not reproduced here, there are to be seen mountain and river scenes in the Protectorate, an orang-utan, and a Dyak warrior and Muruts, all of which had been featured on stamps of previous issues. The series also includes an excellent map stamp.

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For other Stamp Advertisements see also pages 280 and viii.

Stamp Gossip

and Notes on New Issues

By F. E. Metcalfe

FEW British Colonial modern stamps are more popular with collectors than the annual "Health" issue of New Zealand, so news of the next pair, due early in October, will be of interest to many, particularly as a most popular theme has been chosen for the design. As usual there will be two stamps, by Messrs. Bradbury, Wilkinson and Co., and, for the first time, they will be bi-coloured, the 1d.+½d. green and buff, and the 2d.+1d. carmine and brown. The subject for the design is the "Peter Pan" statue in Kensington Gardens, London, a replica of which is to be found in Sefton Park, Liverpool.

An interesting stamp, which we are illustrating, has been issued by Switzerland in honour of the hard-won European peace. No doubt many peace stamps will be emitted in the near future, mostly by those countries that hugged the sidelines during the great conflict; though it is now rumoured in knowledgeable quarters that after the defeat of Japan Great Britain will actually issue one or more stamps, as a gentle pointer to certain quarters that she also has been fighting. Several Dominions and Colonies of course will be doing the same, with equal right, so don't spend all your cash on synthetic ice cream; some is going to be needed for the jolly old collection.

Not for some time has it been possible to show any new stamps from that philatelically popular country, Finland. The one shown this month is from a short set issued to raise funds for the ubiquitous "Red Cross." Just to keep it company we are popping in another, from Venezuela, with the same purpose, or shall we say purposes.

As used copies of the ordinary current issue of Argentina are so easy to obtain, most general collectors manage to get them, even in these days of scarcity; but apparently not many have noticed that some of these stamps are coming in an entirely different paper, which looks to be without watermark. There are very slight traces which may be part of a very faint watermark, but for all practical purposes it does not exist.

This can surely be only a temporary measure, for forgeries appeared the last time Argentina issued stamps without watermark, not to deceive collectors but to defraud the Post Office. But for their early discovery by the Argentina Philatelic Society the result might have been serious. This happened in 1921. It would be practically impossible for current stamps to be extensively forged without collectors spotting the fraud very quickly, but the Post Office itself could be quite easily deceived, at least for a time, and their loss could be great.

The two new high values of British Guiana, the $2 and the $3, have now appeared. As previously mentioned, the designs of the 60 c. and 72 c. of the last George V pictorial issue have been adapted, and actually the new stamps look very similar to the old, only the values differing.

Dealers report a curious demand for the now defunct 72 c. stamp. This has been in use from 1934 until the beginning of June of this year. Surely this is long enough for every interested collector to have secured a copy, yet one well-known provincial dealer reports orders for over 500 copies within a week of the news of the stamp being dropped. Few of these could be supplied. The probable reason was that when it was too late collectors decided to include the stamp in thei collection of George VI issues. The 3 c. and the 12 c. stamps of British Guiana, still current, are also carryovers, not likely to be in all collections, so now is the time to secure them.

For the past few months tips have been given of a stamp or stamps well worth prices then prevailing. It is an easy matter to mention good stamps that in the long run will prove bargains, if high-priced stamps or obvious snips are selected, but the aim has been to pick stamps easily within the reach of all pockets and not too difficult to procure. Well, this month it is proposed to reverse the process. Not only will high-priced stamps be referred to, but it will be suggested that you don't buy!

Offers are being made all over the place of Great Britain stamps, cut in halves diagonally and with a Channel Islands postmark, presumably from the period of German occupation. The prices asked for these items vary from one to several pounds, but collectors will be well advised to leave these things severely alone until they have found their real market value, which may be very much lower than that prevailing to-day. On the other hand, the definitive stamps of both Jersey and Guernsey, though plentiful, are worth buying at a shilling or two a set.

From Our Readers

This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

A GREAT SOUTH AFRICAN HOSPITAL

Out in the country, yet within easy reach of Johannesburg, the "City of Gold," there are the wonderful buildings of the Baragwanath Military Hospital, built by South Africans for the British

Field Marshal Smuts opening the Imperial Military Hospital at Baragwanath, Transvaal, South Africa. S.A. Official Photograph.

Government. When full the hospital can take up to 1,200 patients, and to it have come thousands of British, Polish, Greek, French and Commonwealth soldiers.

Originally all types of wounded men were looked after, but to-day the work being done is for T.B. patients. The treatment in most cases is very long, and so everything possible is done to make the men's stay as happy and interesting as possible. Each ward is adopted by some business houses or war fund organisation, which undertakes to bring and supply the 30-odd patients with such comforts, etc., as they may need.

When the hospital was opened by Field Marshal Smuts in September 1942, the grounds were just bare veldt. Now there are trees, flowers and lawns, together with Tarmac paths and roads. The patients have two excellent bowling greens, a putting green, tennis courts, playing fields and a full size swimming bath. For other curative occupations patients may learn music, office routine, languages, leather and fancy work, and there is a very fine workshop.

To the Y.M.C.A. falls the responsibility of keeping the "Boredom Bug" away, and I was engaged on this work for a time. The organisation has a well-equipped hall, with games, books, reading and writing matter and canteen where light refreshments can be obtained. A trolley service to the wards supplies cigarettes, sweets and the odds and ends bed patients may require. Cinema shows, concerts, quiz evenings, boxing and other entertainments are arranged in the Main Y.M.C.A. Hall, and patients who cannot leave their beds have cinema shows and concerts provided for them in their wards.

E. W. SYKES (Johannesburg).

A BULL AND A WELL

The derivations of the names of English towns and villages are often quaint. A good example is the name of Bulwell, in Nottinghamshire, about which there is a curious story. A long time ago, before the village existed, a traveller passing through the neighbourhood had the misfortune to be chased by an infuriated bull. Not knowing which way to turn he fled towards a steep rocky bank, and there avoided the onrush of the bull by turning sharply. The bull was unable to pull himself up. He crashed violently head first into the rocky barrier, and water immediately gushed from the holes made by his horns.

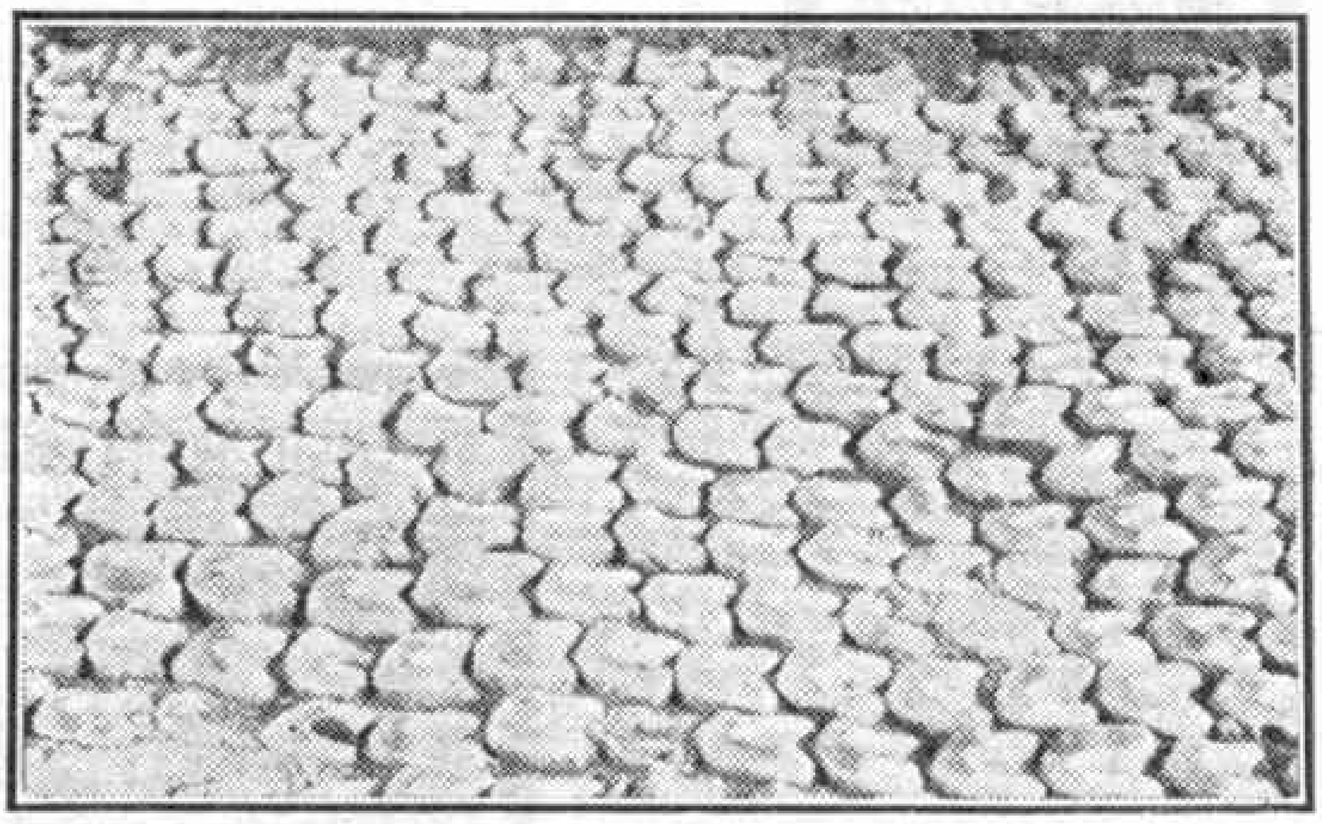
People later settled near the spring tapped by the bull. The incident, legend or truth, is commemorated over the main entrance to the local school, where there is an engraving on the stone showing the traveller fleeing from the bull.

R. G. MARLOW (Bulwell).

SHEEP'S BONE FLOORING

I recently photographed two surviving portions of a sheep's bone floor in Wantage, and one of these is illustrated on this page. I gather that such floors of sheep's knuckle bones were not uncommon in the 17th century. I have never seen another floor of this kind, but I have a recollection of a report a few years ago of the finding of a layer of horses' skulls, arranged methodically under a wooden floor. I cannot recall any explanation of it. In another instance the floor between the library and the nursery of a mansion was packed with seashells, so that the peace of the library should not be disturbed by nursery noises. Possibly the idea of putting horses' skulls under a floor was to deaden noise in a similar manner. To-day there are less gruesome ways of doing this.

P. STEPHENS (Kingston-on-Thames).



A floor of bones. Photograph by Miss P. Stephens Kingston-on-Thames.

Competitions! Open To All Readers

A Summer Doublet Contest

It is a long time since we arranged a Doublet Contest. Previous competitions of this kind were very popular, and as competitors require only pencil and paper to work them out they are specially suitable for a holiday month.

For the benefit of new readers we may explain that a Doublet consists of two words, each containing the same number of letters. The problem is to change from the first word to the second by placing connecting words, or "links" between them. Each link consists of a word differing in only one letter from the word before it in the chain of links.

In order to make this quite clear we give an example. "Run TRAIN on TRACK." The solution is: Train, Trait, Tract, Track. This example, in which there are two links, is simpler than those set in the competition, in which we have 12 Doublets, the details of which are given in the panel on this page. The aim of the competitors must be to make the changes with as few links as possible, and they are recommended to go carefully through their solutions in order to make sure that there are no short cuts that they can introduce. Only words appearing in a standard dictionary are allowed, and the names of persons, places etc. must not be used.

1. **Blow HORN on ROAD**
2. **Break SPINE of SHARK**
3. **TIRE Yourself with WORK**
4. **Find FISH in MINE**
5. **Lose GOOSE in HOUSE**
6. **Change SIDE to BACK**
7. **FILL up the HOLE**
8. **Chase TRAMP with BRUSH**
9. **AWAKE a DWARF**
10. **SMITE the SKULL hard**
11. **SNORT in the SMOKE**
12. **The WORD is PACE**

In judging the entries the 12 Doublets will be considered as one competition, and the prizes will be awarded to the competitors whose entries show the lowest numbers of links. If there is a tie for any prize the neatness and novelty of the entry itself will be taken into consideration.

In this competition there are two sections, as usual, for Home and Overseas readers respectively. In each there will be three prizes, of 21/–, 15/– and 10/6 respectively, and in addition consolation prizes will be awarded for other deserving efforts. Entries should be addressed "*Summer Doublets Contest, Meccano Magazine, Binns Road, Liverpool 13.*" The closing dates are 29th September in the Home Section, and 30th March 1936 in the Overseas Section. Each entry must bear the sender's name and address.

Engine Names from a Slogan

We all know that the railways have done a wonderful job of work in carrying munitions of war during the past five years, and we are conversant with the slogan "BRITISH RAILWAYS ARE CARRYING ON." We are using this as the basis for an interesting contest, in which all that is necessary is to use the letters occurring in the phrase to build up names of British locomotives.

Any letter used more than once in the slogan may be used the same number of times in forming the engine name, but no letter must be used more often than it appears in the statement. To give examples, "*Atlas*" and "*Ocean*" satisfy the conditions, but "*Rob Roy*" does not, as this name has the letter O twice in it, and this letter appears only once in the slogan. In each case, in addition to the name of the locomotive, the owning company, number, wheel arrangement and class must be stated.

There will be two sections, one for Home and the other for Overseas readers, and in each prizes of 21/–, 15/–, and 10/6 will be awarded to the competitors who send in the most complete lists. In the event of a tie for any of the prizes, general neatness and novelty of presentation will be taken into consideration by the judges. Each entry must bear the sender's name, address, and age clearly written on the back of each sheet submitted. Failure to comply with this rule will result in the disqualification of the entry. Envelopes should be addressed "*Engine Name Building Contest, Meccano Ltd., Binns Road, Liverpool 13.*" The closing date in the Home Section is 29th September, and the Overseas Section closing date is 30th March, 1946.

August Photographic Contest

This month's photographic contest is the 8th of our 1945 series, and in it, as usual prizes are offered for the best photographs of any kind submitted. There are two conditions—1, that the photograph must have been taken by the competitor, and 2, that on the back of the print must be stated exactly what the photograph represents. A fancy title may be added if desired.

Entries will be divided into two sections, A for readers aged 16 and over, and B for those under 16. They should be addressed: "*August Photographic Contest, Meccano Magazine, Binns Road, Liverpool 13.*" There will be separate sections for Overseas readers, and in each section prizes of 15/– and 7/6 will be awarded. Closing dates: Home Section, 31st August; Overseas, 28th February 1946.

A Railway Enthusiast Abroad—

(*Continued from page 258*)

credit of the managements it should be added that the standards of service, speed and equipment were most enterprisingly enhanced during the years before 1939.

The main lines of the Nord led to Amiens, Boulogne, Calais, Arras, Laon and Belgium, and branches served northern and north-central France, including colliery and industrial regions. In addition there were many suburban services. The P.L.M., that is the Paris, Lyons and Mediterranean Railway, was a vast system serving the whole of the south from the Spanish to the Italian borders, including Lyons, Marseilles and Geneva. It had important Italian and Swiss connections and over it ran a remarkable number of long-distance expresses on the Paris-Marseilles route.

Of the other three French railways the Est served most of the south-east of France to Rheims, Luxembourg, Strasbourg, and Alsace-Lorraine generally, with connections to Switzerland or beyond. The Paris-Orleans-Midi, which was largely electrified, ran to Orleans, Tours, Bordeaux and down to the Spanish frontier, while the State Railway led to the mid-western area, including Normandy, Brittany and the Channel ports Brest, Cherbourg, Dieppe and Havre. This also was partly electrified, as was its intensively worked Paris suburban system.

There was also a separate local system in Alsace-Lorraine, on which right-hand running was the rule—that is trains passed one another on the left as in Germany. This plan also applied in Luxembourg. Through trains from the neighbouring countries of course worked through Alsace and Luxembourg. As from January 1938 all French railways, in which the State had always had certain controlling interests, were absorbed into the French National Railway Company, in which the State held 51 per cent. of the share capital and the companies or their nominees 49 per cent.

How Ilford Selo Films are Made—

(*Continued from page 269*)

new loops are formed, which travel on without ceasing to the end of their journey—and a very long journey it seems to be.

The drying tracks are several hundred feet long and are divided into a series of bays, through which the coated film passes slowly. As the film travels along the track the temperature changes from very cold (which sets the emulsion), gradually warming up in each successive bay, then cooling down to normal at the reeling end of the track. The newly coated film is now at the end of its journey, dry, perfect and ready for cutting up. The hundreds of sticks which carry the film along in the festoons are meanwhile returning to their starting place to take up another load of loops.

Throughout its long journey the coated film is untouched by human hands. Machinery serves the coating machines with emulsion and guides the celluloid to the coating troughs, pulling it taut for the coating operations and then picking the coated celluloid up and hanging it in symmetrical festoons.

Machinery drives the film forward through the changing temperatures and rolls it up at the end of its journey, dry and ready for slitting and cutting into roll film lengths.

The wide band of film, after being reeled at the end of the drying track, goes on to a slitting machine which divides it into long lengths of suitable width. This machine, which is illustrated on page 269, comprises a series of pairs of circular knives which can be adjusted according to the width of film it is desired to cut. The strips are then cut into the appropriate camera lengths and backed with light-tight paper, the two being fastened together at a given position. Spooling is a hand operation, and a small army of girls wearing white gloves dexterously wind the film on the spools.

Cartoning is done by machinery, which wraps the spools in red wax foil, picks up the flat cartons and opens them, inserts the wrapped film and then sticks down the ends of the cartons, passing the film out on a conveyor band. These machines wrap and pack the cartons at the rate of 20,000 a day.

This is very briefly the story of Ilford Selo film, which, apart from its uses by amateur photographers, in industry and the sciences, has proved during the War an invaluable ally to all the fighting services. When the history of the War comes to be written it will be shown that photography has played a very notable part in achieving the victory which has been won.

Bombers of the Red Air Force—

(*Continued from page 267*)

"Stormovik," but this name does not really belong to any one aircraft as it means "assault bomber." IL-2s spearheaded every Red Army attack and wreaked terrible havoc among Hun armoured columns. But perhaps their outstanding achievement was the destruction of a very high percentage of the Junkers 52 transports being used in an attempt to supply the trapped German 16th Army at Staraya Russa early in 1942.

The IL-2, which has a wing span of 47 ft. 10 in., is somewhat similar in general layout to the Fairey "Battle," but is, of course, newer and more formidable. An unusual feature is the way in which the main undercarriage wheels retract backward into large bulges under the wings. The normal armament consists of two 32 mm. or 23 mm. cannon and four machine-guns, and eight rocket-bombs are also carried on special rails, four under each wing. The IL-2 was the first modern aircraft to be armed with rockets, and much of its success as a tank-buster has been due to these formidable weapons, combined with the fact that it is so extensively armoured that it can fly through what pilots refer to as "ten-tenths light flak." As a result it had the lowest loss ratio of any aircraft on the Russian Front.

As well as the aircraft described in this article, the Red Air Force also has several other types of bomber in service, including the SB-2bis, AR-2 and SU-2, but lack of space precludes a detailed description of each of these aircraft. Nevertheless, it has been due in no small part to the combined efforts of all these types, fitting into the great pattern of Red Army strategy, that the invader has been driven from the soil of Russia and taught that most bitter of all lessons—the lesson of utter, irrevocable defeat.

COMPETITION RESULTS

HOME

April "Names Contest."—1st Prize: H. R. Simpson, Birmingham 28; 2nd Prize: D. J. D. Gilbert, Bromley; 3rd Prize: I. G. Davies, Ruabon. Consolation Prizes: J. H. E. O. Harradence, Leicester; A. E. Groves, London E.11; J. Chambers, London S.E.9; D. Barugh, London S.W.20; T. Oldham, Bulwell; G. A. Aldridge, Harpenden.

April "Drawing Contest."—1st Prizes, Section A: G. G. Moon, Broadhenbury; Section B: R. Everett, Norwich. 2nd Prizes, Section A: P. D. Hancock, Edinburgh 10; Section B: J. J. Eales, London E.11. 3rd Prizes, Section A: J. Moody, Dalkeith; Section B: J. F. Harris, Port Glasgow. Consolation Prizes: P. Farrer, Twickenham; N. Macmillan, Giffnock; J. Symonds, Chorley; A. R. Cameron, Old Kilpatrick; R. T. Fox, London S.E.22.

April "Photographic Contest."—1st Prizes, Section A: W. E. Silvester, Bromley; Section B: D. Walters, Hounslow. 2nd Prizes, Section A: R. Atkins, Monton; Section B: J. Belgrave, Hove 3. Consolation Prizes: C. A. Reader, Guildford; F. G. Reynolds, Sidcup; A. J. Brown, London N.20; J. Nicol, Dingwall; D. J. D. Gilbert, Bromley.

Fireside Fun

Arctic Traveller: "The cold was so intense that I simply dare not pat my dogs."

Listener: "Why not?"

Traveller: "Their tails were frozen so stiff that they would have broken off if they had wagged them."

* * * *

"How is it none of the passengers on top has a ticket?"

"Lumme! That's what comes of living in a bungalow!"

* * * *

"You should have seen the mosquitoes we had out in the jungle."

"Big ones, I suppose."

"Oh yes. A lot of them would weigh a pound. They were fierce too. As we passed they would just get on a tree and bark."

* * * *

"I see young Jones is back. Has he changed much since he went away?"

"No, but he thinks he has."

"What do you mean?"

"Well he is always talking about what a fool he used to be."

* * * *

"I got my start in life through picking up a pin as I went out of an office where I was refused employment."

"Oh yes, I know that yarn. The manager was impressed, called you back, and——"

"Nothing of the kind. It was a diamond pin and I sold it for a lot of money."

* * * *

"I wonder what that tiger would say if it could speak, Dad?"

"It would probably say 'Pardon me, Sonny, I'm a leopard'."

BRAIN TEASERS

SOLVE THIS IN TWO MINUTES

Here is an easy one to start with, a long division sum complete with working. The only snag is that each number is represented by a letter.

```
AM)NPQR(SMT
TN
---
UQ
.MQ
---
ARR
 QA
---
 Q
```

Can you find what figures should be inserted here?

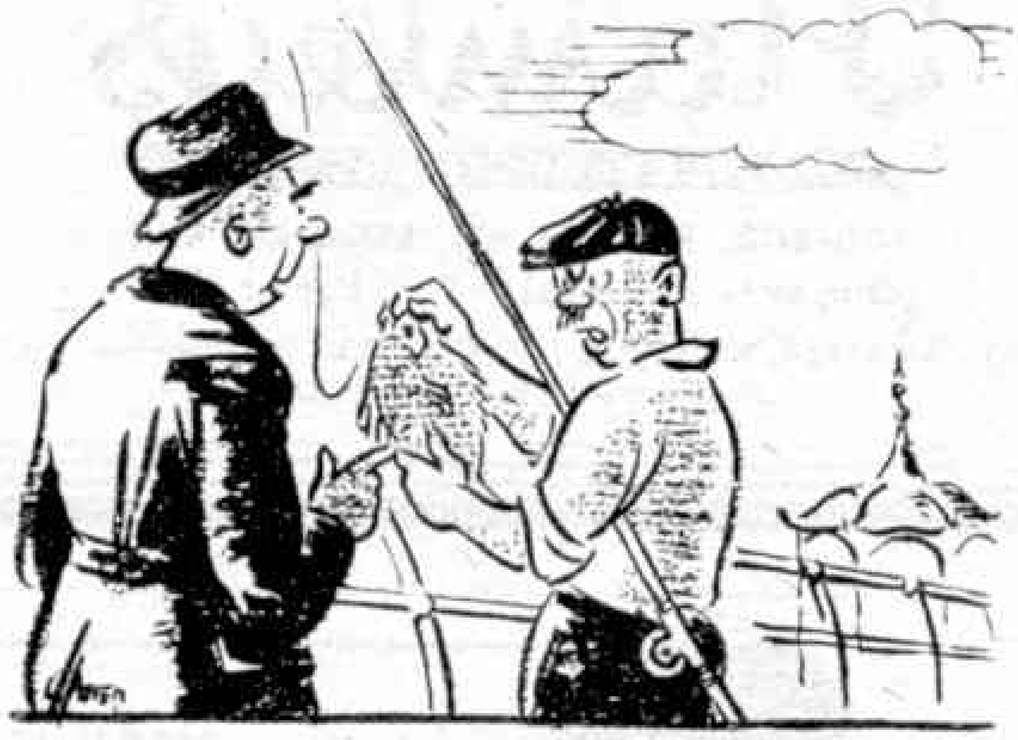
* * * *

A BIT MIXED

Jim Smith's Meccano Outfit contained three times as many parts as his brother Tom's, but Johnny Green's contained twice as many as Jim Smith's. Between them Johnny Green and Tom Smith had 147 parts. How many parts did Jim Smith possess?

B.I.N.

* * * *



"Why are you throwing it back, Harry?"

"I don't want one that's been trod on!"

* * * *

YET MORE MIXED

A beggar was asking a lady for work. He said that he had already had many jobs, of which three times as many were in the country as in the town, and that he had done 20 for Farmer Brown and three times as many for Farmer Smith as for Farmer Giles.

"That's very confusing" the lady said, "and anyway are you telling the truth?"

"Oh yes," replied the beggar, "and I have done three quarters the number for Farmer Giles that I have for Farmer Brown."

"That's quite clear now," replied the lady, "and you are not telling me the truth." How did she know?

B.I.N.

* * * *

A FAMILY AFFAIR

A man was buying tickets for a party and when asked how many he required he said: "We are brother, sister, two cousins, father, mother, uncle, aunt, nephew, niece, son and daughter." What was the smallest number of tickets he could have needed?

T.K.C.

* * * *

SOLUTIONS TO LAST MONTH'S PUZZLES

The tough metal in our first puzzle last month was molybdenum. The words made up from letters in this name, which provided the clues, were lye, mole money and bud.

The word required in our second puzzle is:

SAGAMEALTOADITCHATOMENVY

* * * *

THIS MONTH'S HOWLER

A comma is what a medium falls into.

IT WON'T BE LONG NOW!

Good news for boys! Supplies of toys, games and models will soon be improving and for those who are wise and do their shopping early we hope to have some of the things they have been awaiting for so long. As always, we shall have the largest and finest selection from which you can make your choice.

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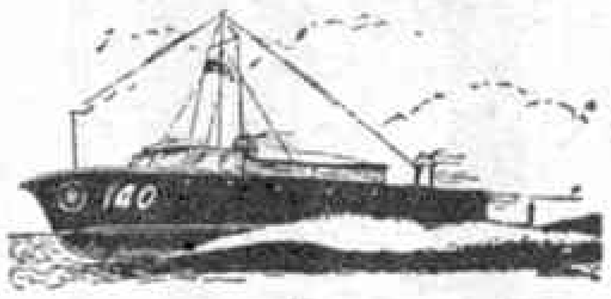

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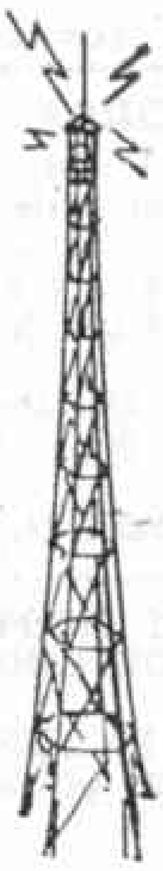

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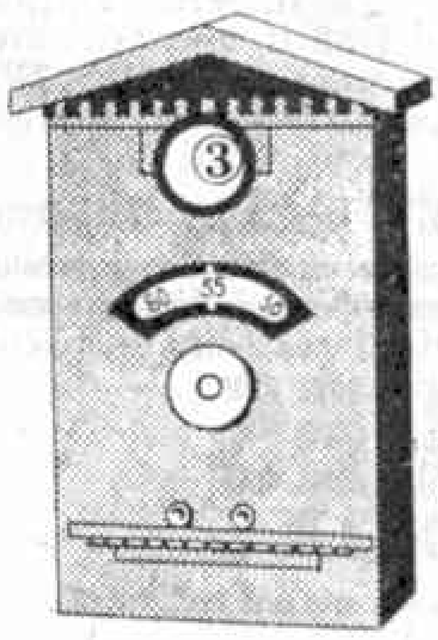

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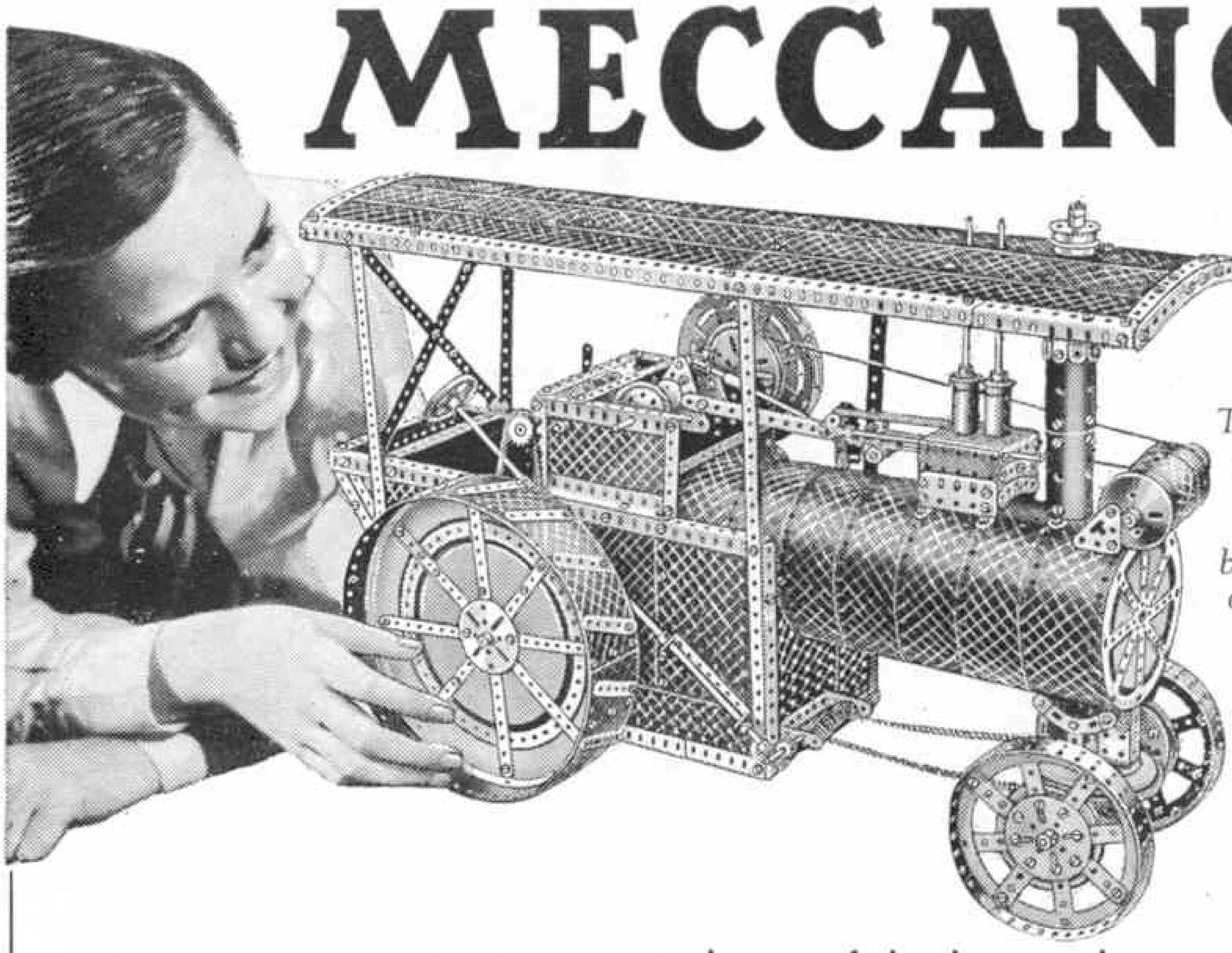

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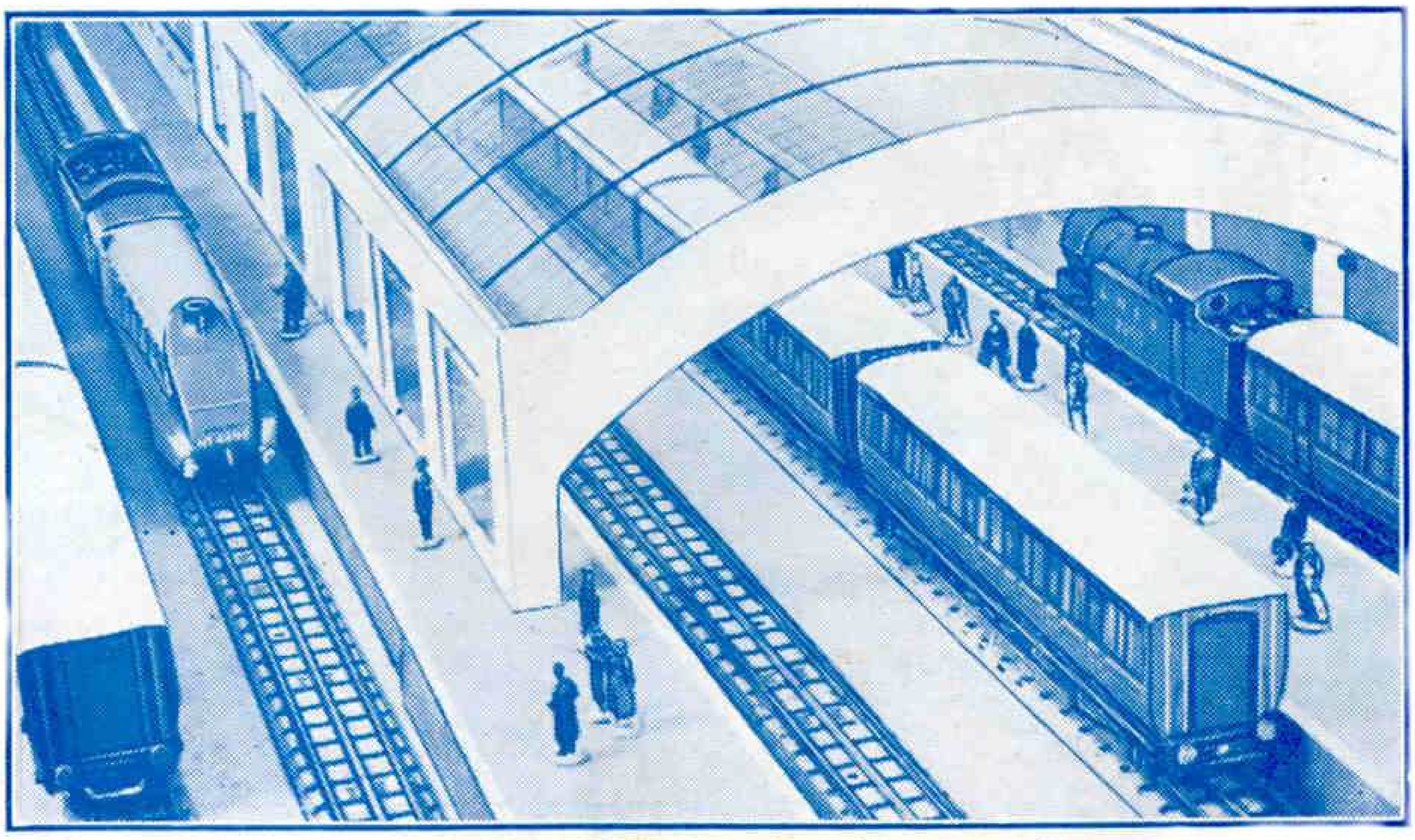

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